The
# Electrical Review

VOL. CXIII. JULY 14, 1933 No. 2903.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

## Principal Contents:


| | PAGE |
|---|---|
| Sulphur Elimination | 37 |
| The Contractors at Torquay | 39 |
| Electricity in Gas Works. By C. H. S. Tupholme | 42 |
| A Gearless Electric Clock. By T. R. Robinson | 43 |
| Costing Bulk Supplies. By J. C. Petersen | 44 |
| Cooker Reconditioning | 45 |
| A Grid Supervisory Scheme | 46 |
| An All-welded Test Bridge | 47 |
| Water-jet Conductivity | 48 |
| A Novel Tramcar | 49 |
| Cleansing Flue Gases | 50 |
| Correspondence: The Reorganisation of E.D.A.—and After; The I.E.E. Council Election; Problems for the Contractor; Hire Charges for Domestic Apparatus; Rent Restriction and the Electrical Industry; What is a Consultant? Experience Tells | 51 |
| Special Oscillograph Equipment | 52 |
| New Apparatus and Devices | 53 |
| Canadian Electrical Trade | 56 |
| The Rhodesian Electrical Market | 56 |
| Business and Industrial Notes | 57 |
| Electricity Supply | 61 |
| Traction | 63 |
| Communications | 63 |
| Contract Information | 64 |
| Notes | 65 |
| Our Personal Column | 66 |
| New Companies Registered | 67 |
| Returns of Electrical Companies | 67 |
| City Notes | 68 |
| Stocks and Shares | 69 |
| Published Specifications | 71 |
| New Work for Contractors | 72 |


## Sulphur Elimination

OPPOSITION to the erection of larger power-stations in densely populated areas has centred round the damage that might be caused by (1) grit and smoke and (2) sulphur oxides. The choice of effective methods of coping with grit and smoke was mainly a matter of collating available experience on the subject. This has been done by the Taite Committee, whose report was reviewed in our issue of December 23rd last, and we can regard this problem as solved.

There remained the much more complex and also novel question of how to deal with the sulphur emissions, which loomed so large at the time of the Fulham inquiry at the end of 1930. Point was then given to criticisms by the injunction with regard to the Barton station, although the technical advisers of Fulham Corporation produced evidence that their own tests were proceeding satisfactorily.

The practical issue provided by the Barton case stimulated investigation, and Dr. S. L. Pearce, who, with other engineers and chemists, presented a notable paper on Tuesday before the Society of Chemical Industry, was one of the consultants appointed to devise means for meeting the requirements of the Court.

The authors describe four years of research and give details of the sulphur-elimination plant installed at Battersea, which is the first power station in the world to be so equipped. The importance of this work is that it is the outcome of a study with full-scale models. Many of the results are empirical at this stage, and the reasons for some of them, such as the marked effect of introducing ferric oxide into the system, are still obscure, but for the present purposes that does not matter.

The London Power Co. has reduced by 90 per cent. the concentration of $SO_2$ in coal containing 1 per cent. of sulphur by following up the line of investigation that promised the best results in the earlier trials at Grove Road—the washing of the flue gas without unduly reducing the alkalinity of the River Thames. Less than 5 per cent. of the water used for condensing is required for the process, and the addition of a little lime or chalk provides further neutralisation.

The capital expenditure on the plant at Battersea works out at about £1 per kW installed in the first half of the station, and the running cost for pumping and alkali at 3d. per ton of coal burned. From the itemised statement given in the paper it would appear that for a smaller station the total cost would not be very considerably less, and hence the cost per kWh might prove unduly high. Further information on this point would be welcome, as few of the new stations will be projected on the scale of Battersea.

Possibly, as a result of further inquiry based upon the work of the authors, economies in construction will be found practicable that will make the plant suitable for capital stations of 50,000-kW capacity where the conditions make its use desirable.

**The House-to-House Canvass**

THE "tenth point" which Sir Arnold Gridley suggests, in our "Correspondence" pages to-day, as an addition to the nine advanced by "Candidus" a fortnight ago, does not lose any of its importance because it is not new. If it was not covered in detail in point No. 1 ("Candidus"), it has, at any rate, been urged editorially by us again and again as well as by our special contributors. To convert an existing lighting consumer into an enthusiast for "other uses" is likely to be easier than to secure an entirely new customer. In various articles on the need for a systematic canvass everywhere attention has been directed to the immense scope that exists for adding all kinds of domestic apparatus. E.D.A. has concentrated on the "more plug points" subject in some of its campaigns, and any electricity supply man worth his salt must surely regard premises already connected as particularly vulnerable points of attack. We shall do little good,

through a reorganised E.D.A. or in any other way, unless, as somebody recently expressed it, we "come down to earth" and get the public interest in electricity really intelligently aroused. We firmly believe in the systematic house-to-house canvass as a means to that end. Publicity alone is not a substitute for personal contact; they are complementary.

---

**Trade or Technics?**

DURING the discussion of Mr. Gilbert's paper on "Earthing" at last week's E.C.A. Conference, Mr. H. F. Truman complained that, although there were many matters of importance to the contracting trade on foot at the moment, the Conference was asked to listen to and discuss two papers of a technical character. The complaint was not unfounded, for, after all, the Electrical Contractors' Association is a trade organisation—not a learned society. Frankly, the members want to know how to make more money, or, at least, how to safeguard their present position, and, while the two papers were of considerable interest, they did not immediately contribute much to that end. The Association may reply that the annual report dealt with business matters upon which questions could have been raised, but everyone knows that there is a tendency to take annual reports for granted, and, anyway, the time allowed was insufficient for any effective discussion. We think that the practice in past years f ensuring that one of the papers could form the basis of a general discussion was very sound, and should have been continued.

---

**A Big Change-over**

THE production of electricity is a specialist business which industrialists in other spheres will be well advised to leave to those whose sole job is to generate as efficiently and at as low a cost as possible. It has often paid manufacturers to scrap existing generating plants in favour of a public supply. An important example of this has occurred at Sheffield, where Messrs. Thomas Firth & John Brown, Ltd., the prominent iron and steel concern, has just concluded a ten-year agreement with the Corporation. By this the company undertakes to pay a minimum of £10,000 a year and to close down a generating plant which has cost it over a quarter of a million sterling.

---

**Dock Lighting**

NOWADAYS the value of contrast in illumination is generally recognised, and we have gone far beyond the view once in vogue that good diffusion was all that mattered. The need to fix minimum as well as average values where poor light might cause danger is perhaps not so well realised in practice as it should be. This point is emphasised in Technical Paper No. 14 of the Department of Scientific and Industrial Research (Stationery Office, 9d.), which, though nominally relating to docks, contains a great deal of matter of general industrial interest. Thus, it deals with the saving in energy obtainable by the use of whitewash in the interiors of warehouses, which is likely to be from 10 to 20 per cent. with standard industrial reflectors. This is one of those simple ways of obtaining real economy that the electrical industry should take every opportunity of pointing out to works owners generally. The more electricity the consumer saves the more he will use.

---

**Adequate Supplies**

A USEFUL job of work for the mains staff of a supply undertaking during the summer season is an investigation of the question as to how far supplies of electricity are really available to the consumers in the area. As an obvious preliminary measure, the proportion of residential property of all types situated on the route of low-voltage mains can be ascertained, if this has not been done already. But mileage figures alone are not enough to show whether the supply facilities are adequate to meet modern needs, as the cross-sectional area of the copper may be too small to supply more than the requirements for lighting and for irons and bowl fires here and there. Three groups are, therefore, needed to cover residences in streets (1) with distributors of 0.1 sq. in. or more, (2) with smaller cables, and (3) with no cables. For this rough approximation voltage drop and economic current densities need not be considered, as these can generally be dealt with on a.c. systems easily by putting down intermediate transforming sub-stations and looping in the distributors.

---

**The Cost of Smoke**

A SPECIAL conference of the National Smoke Abatement Society has been called for to-day (Friday) to consider schemes for reducing the damage to buildings by smoke and fumes. In London the damage to Government buildings alone has been estimated at £120,000 per annum, and the loss to property owners throughout the country at over £2,000,000 per annum. Taking the average overall cost of supplying a kWh at 1d., this loss would pay for nearly 500 million kWh, enough to keep 125,000 small all-electric homes going, which otherwise would be adding to the nuisance.

---

**Street Lighting Progress**

IN view of the interest aroused in the application of gaseous-discharge lamps to street lighting, it was to be expected that the Association of Public Lighting Engineers would discuss the subject at its annual conference, which will take place from September 4th to 10th. Mr. G. H. Wilson has agreed to read a paper on the subject. Is this to be the only form that "gas lighting" will take in the future?

---

**A Strong Position**

IN these days, when some of the greatest industrial concerns are hard put to it to keep going, it is gratifying to see one of the oldest electrical companies keeping its end up. Sir Montague Hughman, at Henley's annual meeting last week, spoke with just pride of the company's achievements and sound financial position. In the face of depression and falling prices the company suffered a reduction of only about 8½ per cent. in its profit. In actual fact, the amount of work carried out was larger than in the previous year, but it was done with a smaller margin due to the necessity of meeting fierce competition. Although Sir Montague did not seem to expect a great deal from the World Economic Conference, he assured the shareholders that the company was well equipped, financially and technically, to meet any demands which improved conditions might awaken as a result of any agreement that was reached.

---

**Distribution Losses**

THE loss between power station busbars and the meters on consumers' premises averages, for the whole country, nearly 13 per cent. This is more than twice as much as is used by the power station auxiliaries. Some improvement should be possible by care in operation and the keeping of adequate records of plant performance. Curves plotted to show the losses in transformers operated in various combinations often give surprising results. Transformers which work well in parallel may have different efficiencies; the best should be run continuously instead of each being used in turn to carry the lighter loads. Again, a large transformer may have a higher light-load efficiency than a small one, but the tendency is to regard the smaller unit as necessarily the one to use when the demand is within its range. We should like to see the same care that is devoted to maintaining a continuous test on generating plant applied to the transmission and distribution systems.

# The Contractors at Torquay

## The eighth annual conference

THE officials and members of the Electrical Contractors' Association and its allied bodies went "all out" to make last week's conference even more successful than its seven predecessors. In this they were fully supported by the weather, which remained excellent throughout. From both the business and social points of view the arrangements worked very well. The president's reception at the Medical Baths on Wednesday evening; the smoking concert at the same place on Thursday evening; the garden party at Tor Abbey on Friday afternoon; and the ball and supper at the Town Hall on Friday evening, were all outstanding successes to which the ladies contributed very largely indeed, and good humour prevailed everywhere and at all times.

Several "outside influences" played important parts during the conference. Notable among these were the lectures and demonstrations held by E.L.M.A. for the public and various local professional and trade organisations. A lecture-demonstration on "Modern Tendencies in the Lighting of Buildings" given to the Torquay Builders' Association on Wednesday was particularly useful. Then there were the special floodlighting of buildings, including the red-brick Town Hall on the "Osira" system, and window displays in various parts of the town by contractors and manufacturers. There was a special window display of "Ediswan" domestic equipment at the showrooms of Sydney Truscot, Ltd. (local contractors), and we also saw a "Conference show" of "Tricity," "Supreme" and "Universal" domestic appliances arranged by L. G. Hawkins & Co., Ltd.

**The E.C.A. Council**

**Left to right, Front row: Messrs. F. J. Hawkins, W. Riggs, H. Willoughby Ellis, W. R. Rawlings, H. J. Cash, W. B. Williams, J. Orringe, L. C. Penwill (director), N. Aish and T. E. Alger. Middle row: Messrs. T. C. Gilbert, A. G. Bruty, J. H. Edwards, G. Taylor, C. H. Westlake, E. A. Reynolds, R. Robson, A. Smith, J. D. Green, W. Cross, J. Walsh and R. W. Kennedy. Back row: Messrs. H. E. Walker, P. Hewitt, H. Mountford, F. W. Cook, F. Madge, W. I. Jones, W. H. H. Hyde, W. T. Porter, H. J. Galliers, H. M. Drake and W. H. Walton**

### The Earthing Problem

At the annual general meeting early on Thursday morning Mr. W. B. Williams presented his report, and later the Mayor of Torquay (Mr. W. Dennis Thomas) heartily welcomed the delegates to his town. He said that such conferences must do much good, not only to the associations concerned, but also to the general public. The Torquay undertaking was a justification of the belief that the supply industry should be in the hands of local authorities.

The subsequent delivery of his presidential address by Mr. Williams was enthusiastically received, and it was obviously appreciated that "The Aims of the Electrical Contractors' Association" needed voicing in such an authoritative manner.

The first conference paper, "Earthing or Artificial Earthing," presented by Mr. T. C. Gilbert on Thursday afternoon, provoked a healthy discussion. Mr. H. J. Cash was strongly in favour of the substitution of earth leakage trips for all fuses, but thought that overstatement should be avoided. It was not the potential difference that was dangerous, but the milliamperes that passed through the body. One talked loosely of 230 V, assuming the earth was at zero potential, but that was not always so. If the particular patch of earth was at the same potential as the apparatus, then no current could pass. Small protective wires used with the leakage equipment still presented the ramification to which the author objected. The visible terminal idea was ridiculous. Mr. Gilbert's comparison between 15-A British and Continental three-pin plugs was irrelevant. He could hardly believe that proper solid earthing was dangerous to cattle; certainly in rural areas protection had to be more carefully looked after, and he would make leakage trips compulsory on farms. The main objection to the lampholder was not one of earthing at all.

Mr. A. J. McColgan (H.M. Inspector of Factories) referring to visible earth terminals, said that trouble was more often caused by no earthing at all than by loose connections. Mr. Gilbert's apparatus was not immune from interference. In rural areas high resistances predominated, and great difficulties were presented by earth plates being merely sunk and left without attempts made to ascertain their effectiveness. Neither solid nor artificial earthing was ideal, and he suggested a combination of the two. Without both measurement and maintenance any system would fail.

Mr. E. T. Lawson (A. Reyrolle & Co., Ltd.) thought the author's case would have been improved had he confined it to bathrooms and such places. Solid earthing had proved satisfactory. For rural installations he advocated solid earthing as the main line of defence and the artificial method as the second line. In principle, artificial earthing had been employed in this country for many years, for instance, in the trip frame protection employed by his company in connection with transformers.

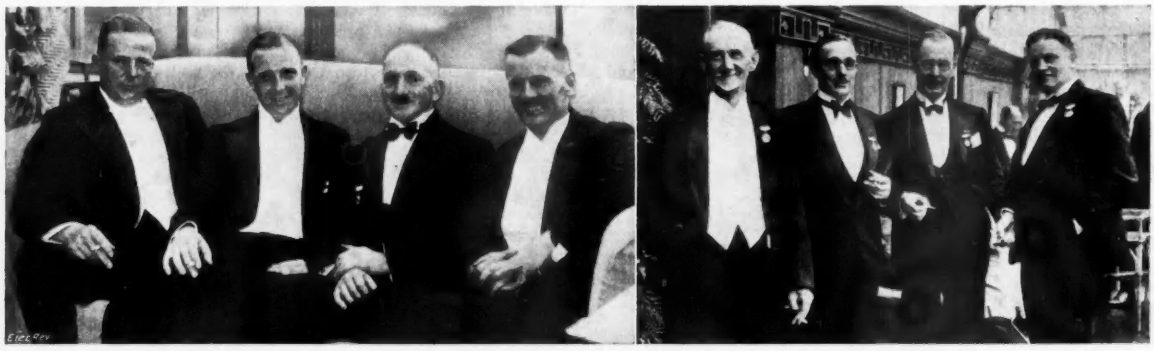
**Mr. Williams delivering his presidential address to an attentive audience.**

### The Concentric System Advocated

Mr. W. R. Rawlings said his first consideration was to protect his clients. He had always held that the present system of earthing was a snare; nobody knew whether the present schemes were working or not. In any house one

could find at present appliances connected on the neutral side. With the one-wire system of wiring throughout the country we should have something tangible, safe and low in cost. Mr. Rawlings read a letter from Mr. A. H. Dykes, who stressed one objection to Mr. Gilbert's system, namely, that it frequently cut off the whole of an installation because of a very small leakage on a small sub-circuit.

Trips for individual appliances meant extra cost, said Mr. W. Cross (Newcastle). If earthing was to be done at all, then all metal which could be accidentally earthed should be



**Some of the delegates and visitors**

**Left: Messrs. G. R. Chard (Union Cable Co.), S. B. Hopkins, T. B. Stanaway (British Insulated Cables) and C. D. Wetton (B.I.). Right: Councillor J. Taylor, and Messrs. A. J. McColgan, W. H. H. Hyde and E. Peacop**

definitely earthed. A great advantage of the author's system was the ease of testing it. He could not see any advantage in visible earthing connections, but he strongly advocated that any earthing connection on apparatus should be such as to suggest to the layman that it was to be used.

Mr. H. Willoughby Ellis supported the plea for the one-wire system of wiring. The screwed conduit installation was made perfect in itself, but it housed securely the two enemies, rubber and moisture-laden air. With the one-wire system

**Mr. T. C. Gilbert explains his system**

fifty per cent. of the trouble would be eliminated to start with. He had devised a means of sealing to overcome troubles at the ends of the wires, and for over twenty years he had obtained 100 megohms to earth in each circuit. He believed in solid earthing for urban districts, but for rural areas there should be a judicious combination of the two systems. Mr. H. F. Truman (Walsall) reminded the conference that the main function of the earth wire was to protect the user; isolation of the circuit was of secondary importance. The two papers presented at this year's conference were truly technical, and could have been dealt with effectively in other ways. He thought it a pity that the conference had not devoted its attention to the more urgent problems arising out of the trade depression.

Briefly replying to the discussion, Mr. Gilbert said, with regard to the suggestion that accidents could not be caused by solid earthing, that in a certain stable several deaths were caused by large potential gradients. Mr. McColgan had queried the reliability of the system, but the largest undertaking in Europe was using it. Solid earthing had *not* served us well; earthing should be local and not general. With the system advocated there would be no need to go to the trouble to produce effective earthing. If the concentric system of wiring were introduced immediately there would be an enormous number of existing installations to be dealt with.

The lecture-demonstration on "Luminous Discharge Tubes" by Mr. J. T. Randall, M.Sc., with which the conference opened on Friday morning, proved of absorbing interest. There was no ordinary discussion, but the author's remarks were supported by Mr. C. C. Paterson (G.E.C.), who said that in the "Osira" equipment they had a new type of lamp which would find a field in connection with general industrial purposes. Its first general application must be in the open air, for the choke coil with which each discharge lamp must necessarily be equipped would prove a serious barrier to development of the lamp in the domestic field.

They were anxious not to repeat the mistake that was made when the gasfilled lamp was first introduced; the half-watt lamp had never been half-watt. He hoped also there would not be competition on claims of efficiency. They did not know what the candle power of a discharge lamp really was to within ten per cent. It would be better to endeavour to establish a mean value for candle power throughout the life of the lamp rather than an initial value. It was hoped to improve street lighting rather than to maintain the present standard at low cost.

Mr. Randall's lecture was followed by votes of thanks to the Mayor, to the authors of the papers (with which the president associated the Wembley Laboratories of the G.E.C.), and to the local stewards. Then, after the usual replies, there was the installation of the new president, Mr. Joseph Orringe (Leicester), by Mr. Williams, who said that the new president had held every honorary office it was possible to hold in the Association. A pleasing feature of the conference was the presentation to the retiring president of a gold watch by the council as a mark of appreciation.

## The New President

Before presenting his short address the new president said he regretted that Mr. H. J. Cash had been unable to accept office, but announced that he had again accepted the vice-presidency. In his address Mr. Orringe said that no good purpose would be served by attempting to cover up the serious facts with which the industry was faced. Developments were taking place which demanded that they should make up their minds exactly as to where they were going and how they proposed to get there. He offered his entire support to the work of Committee "D," and he announced that the manufacturers (B.E.A.M.A.), the wholesalers (E.W.F.), and the contractors (E.C.A.) had agreed to adopt the general fair trading principles formulated by the Committee. Ways must be found to secure agreement among the whole industry.

Following a vote of thanks to the retiring president by Mr. C. D. James (Bath) and a brief reply by Mr. Williams, the

**Mr. L. C. Penwill (director) and Mrs. Penwill**

business session of the conference closed, but the "conference spirit" was fully maintained at the garden party and the ball and supper.

## With the Contractors at Torquay

1. The centre of the "official" group. 2. The President's reception: Mr. T. P. Shillcock, Mrs. F. W. Oakley, Mr. and Mrs. Williams, the Deputy-Mayor of Torquay (Mr. A. D'Espiney) and Mrs. D'Espiney. 3. Messrs. W. Riggs and F. W. Cook. 4. Messrs. B. Gill, N. Aish, and F. J. Smith. 5. The President and Mrs. Williams at Tor Abbey. 6. Messrs. A. G. Bruty, T. E. Alger, R. E. Robson, W. F. Furse, and H. E. Walker. 7. The civic welcome. 8. Mr. W. H. Walton. 9. A break in the morning session. 10. Messrs. G. D. Blatchford, J. Orringe (the new President), and J. Walsh. 11. Mr. H. Willoughby Ellis. 12. Messrs. W. I. Jones, F. Madge, J. H. Edwards, and W. G. Shaw. 13. Messrs. W. B. Williams and W. R. Rawlings. 14. The Western Section welcomes the new President. 15. Interested in Mr. T. C. Gilbert's paper

# Electricity in Gasworks. By C. H. S. Tupholme

THE applications of electricity in gasworks are numerous and they may be conveniently divided into coal and coke-handling plant (*i.e.*, cranes, wagon tipplers, conveyors and breakers, machinery for charging and discharging the retorts, coke cutting and screening), washers, pumps, and oxide handling and disintegrating plant.

Cranes are used usually where the coal is waterborne, such as in the case of some of the metropolitan companies. For example, at the Beckton works of the Gas Light & Coke Co., eight electric cranes, with a capacity of 250 tons per hour each, unload coal from vessels, the hoisting motor in each case being of 120 h.p., while slewing is effected by a 20-h.p. 560-r.p.m. motor. The luffing operation derives its power from a 7-h.p. 570-r.p.m. motor. Fig. 1 (taken from Birks's paper on "The Co-ordination of Power Relative to Gasworks," read before the Institution of Gas Engineers) shows the effect of coal unloading at the Beckton plant on the output of the station. It will be noticed that the voltage remains remarkably steady.

A type of motor which has proved efficient for gasworks coal-handling plant is the "Lo-thermo," by Messrs. Laurence, Scott and Electromotors, Ltd. These motors are used, for example, as pump motors for the hydraulic wagon tipplers, discharging into the breaker hoppers and also for driving the breaker hopper at the Oswald Street gasworks at Burnley. This type has closed air circulation through a radiator, there being no connection between the air inside the motor and the outside cooling air. All the joints are either machined or packed, so that the motor is impervious to the deleterious agents inseparable from gasworks conditions.

## Modern Handling Plant

A most modern handling plant has been installed at the new carbonising works at Southall by the Gas Light & Coke Co. It consists of a Marshall wagon tippler, skip hoist, coal breakers and screens, hand coal elevator, shuttle distributor, and drag line scraper. The skip hoist is operated by a winch driven by a 125-h.p. motor; the screens and breakers, which are in duplicate, take their drive from two 65-h.p. motors with belt transmission; and

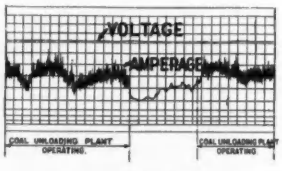



Fig. 1

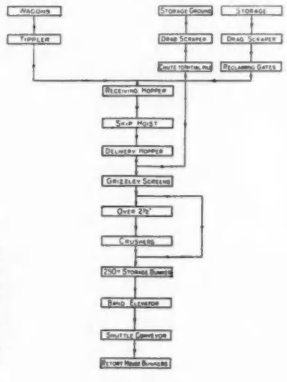



Fig. 2

the band coal conveyor and shuttle conveyor are driven by a 15-h.p. and a 5-h.p. motor respectively. The drag line scraper plant has two winches driven by a 125-h.p. motor, and the cost of storing or reclaiming coal at 150 ft. radius, with electricity at 0.8d. per kWh, is given as 0.564d per ton, labour costing 0.204d. and power 0.36d. The operating costs of the coal-handling plant and the transport of the coal from the railway company's rails to the tippler pit are given by Mr. J. S. Thorman in his paper before the Institution of Gas Engineers as :—

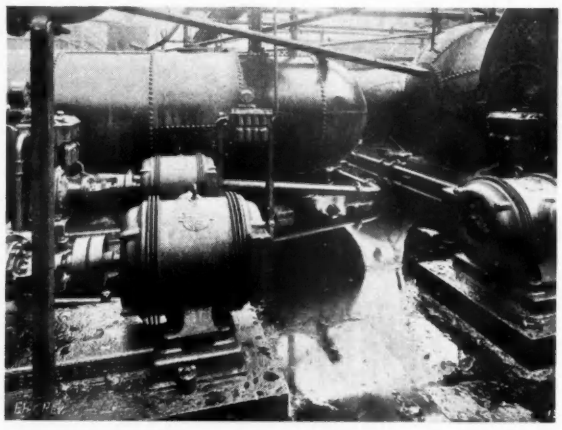
| | Pence per ton of coal. |
|---|---|
| Labour— | |
| Tippler attendant ... ... ... ... ... | 0.191 |
| Skip hoist, grizzly attendant... ... ... ... | 0.191 |
| Band conveyor and shuttle attendant ... ... | 0.130 |
| Labour cost per ton of coal ... ... ... ... | 0.512 |
| Power-cost of electricity, 0.8d. per kWh— | |
| Tippler ... ... ... ... ... ... ... | 0.013 |
| Skip joist and grizzlies ... ... ... ... | 0.279 |
| Conveyors ... ... ... ... ... ... | 0.095 |
| Cost of labour and power ... ... ... ... | 0.899d. |
| Loco. driver, shunter, weighbridge attendant, and checker conveying coal to tippler ... ... ... | 0.600d. |

Fig. 2, which is taken from the paper referred to, is the coal flow diagram at Southall, at each stage of which motors and control gear are used.

The switchgear operations in a gasworks coal-handling plant call for much ingenuity in design and layout, and an excellent example is afforded by that at the Dawsholm Gasworks at Glasgow. This plant is electrically driven throughout, and where one piece of plant is interdependent on another sequence starting has been adopted. Should any element of the sequence stop, all elements near the point of supply will stop automatically, so that there can be no flooding. When a sequence is stopped under normal conditions, each element runs for sufficient time to clear itself of the load.

The motors are all controlled by contactor-operated starters and provision is made by which any sequence can be selected, and, once selected, the motors start up in the sequence chosen with an interval of about four seconds between each.

If any contactor in a sequence fails to close, the whole sequence is rendered inoperative. If any contactor in a sequence opens due to overload, the sequence automatically stops. Should the current be cut off during starting, the



**Motors and control gear in a by-product works. Such conditions are not unusual**

motors can only be started again from the beginning of the sequence. Should the "emergency stop" be used, the whole plant must stop and can only be restarted from the beginning of the sequence.

Electricity is supplied by the Corporation at 6,500 V, three-phase, 25 cycles. It is stepped down to 440 V, three-phase, 25 cycles by static transformers, and then converted into three-phase 50 cycles by temporary frequency changers; 50-cycle motors have been installed.

The main 440-V supply is received on a main switchboard (A. Reyrolle & Co.), and distributed from it to each of the five ranges of busbars placed over the five switchboards formed of marble panels on which the switches and contactors are placed. The destination of the coal is decided before starting, and the electrician is instructed which sequence is to be run. He then proceeds to the switch house and selects the required sequence by pressing a button. His action illuminates an indicator on the coal plant and the coal hand can start and stop that sequence by pressing the local button.

## A Protective Device

A serious situation would arise if the g.b. conveyor were started with no dumper set to discharge the coal. The dumpers are therefore electrically connected in such a way that the sequence will not start unless a dumper has been set by the operator; should it be thrown out of operation, the plant will stop. A signal gong is also provided.

Each motor is provided with three switches, apart from the sequence contactors, *viz.*, (1) an isolating switch at the motor, to cut off all current from it, and from all motors between it and the point of supply; (2) an individual switch in the switch house, which cuts that motor out of sequence, and enables it to be run for testing, &c., by means of (3) a key switch adjacent to the motor, under the control of the operating fitter.

At the Southall works coke-handling plant has been designed to deal not only with the coke from the new installation of intermittent vertical retorts, but also coke from any other carbonising unit, existing or future. A series of belt conveyors, grizzly scalping and gyrex primary screens, and a single roll coal cutter are in operation. The motors in this section of the plant number twenty-one and vary from 3 to 52 h.p., all operating at 220 V d.c. There are also fourteen single reduction gears. The control gear comprises a complete interlocking and sequence starting and stopping system, and emergency stopping devices.

At Burnley the coke crusher is also driven by a 10-h.p. "Lothermo" motor, and of particular interest is the control of the 16-h.p. motor driving an inclined coke elevator. The loaded bucket is made to travel up to a point approaching tipping level, when it automatically slows down and, finally, at the correct point when the bucket is tipped, comes to a dead

stop. Time element control allows a sufficient period to elapse in which to discharge the coke into the hopper, when the bucket automatically returns at full speed to a point approaching the position where it opens the hopper door, slows down, and finally stops in the loading position. At this point time element control again causes it to wait sufficiently long for the charge to enter the bucket, when the cycle of operations begins again. The graded coke is dealt with by means of a shuttle band conveyor discharging into any particular hopper at will, while other conveyors and rotary screens provide the means for dealing with the crushed coke.

Motors and switchgear in gasworks do not differ very considerably from those found in other works, with the exception, of course, that the conditions are very severe. Coal and coke dust and acid-laden moisture are always present, and, in addition, some motors and control gear work entirely in the open.

There are, however, one or two applications which are of special interest, particularly with respect to control gear. One of these is the automatic control of gas mixtures to maintain a constant calorific value. In this case the control is effected by thermostatic means from a flame burning the mixed gas. If the calorific value of the mixture rises above the predetermined figure a small motor-operated valve is set in motion, tending to reduce the supply of rich gas to the mixture. If the calorific value falls too low the valve in the lean gas line is operated, the entire procedure being automatic.

# A Gearless Electric Clock. By T. R. Robinson

AN electric clock which operates without any wheel-work of the usual form has been made in the research laboratories of the Westinghouse Electric Company, East Pittsburgh, Pa., U.S.A. The principle of its action is the interaction of the vernier coupled fields of several concentric rotors and stators. The clock is really a synchronous induction motor of special design, having a number of rotors constructed to rotate at exactly the correct speeds and with the second, minute, and hour hands fitted directly to them.

The outermost component of the assembly consists of an iron ring formed with 118 pole pieces on its inner edge. This ring is wound in such a manner as to produce a magnetic field which revolves 3,600 times per minute when connected to a suitable a.c. supply. Immediately inside the wound stator is the first rotor, also in the form of an iron ring, but without windings and with its outer edge divided up into 120 pole pieces. When in action, the rotary magnetic field set up by the windings of the stator acts in such a manner as to cause the rotation of the unwound ring, but, as the components have unequal numbers of pole pieces, only two are in a synchronised position at any one moment. The other pole pieces cause a vernier action around the circle and, as a result, the rotor ring will only move forward a distance of two pole pieces for each complete rotation of the magnetic field of the stator. Therefore, although the field is revolving at 3,600 turns per minute, the rotor will only turn forward 60 r.p.m.; or in other words, one turn per second. A pointer fixed on this rotor will, therefore, enable fractions of seconds to be indicated.

The next stage is to obtain a speed of one revolution per minute for the seconds hand, and for this purpose the inner edge of the first rotor is divided up into 122 pole pieces. Close inside this, in exactly the same way as in the first assembly, is the second rotor, the outer edge of this being made with 120 poles. Once again the vernier effect occurs, the first rotor being in this case the stator for the second. The construction of the second rotor provides that it turns backwards 59 revolutions relatively to the first rotor, while this is turning forward 60 revolutions, and as a result the second rotor has an actual speed of one revolution per minute.

Beyond this the field set up by the energising coil will not serve, and in order to give the third rotor the correct speed for the minute hand the second rotor carries a permanent magnet. This sets up its own rotational field, and the inner edge of the second rotor having 118 poles and the outer edge of the third rotor 120 poles, the vernier action again comes into play and gives the desired speed of one revolution per hour. The third rotor also carries a permanent magnet which generates yet another field, and the inter-action of 22 poles on the rotor with 24 poles on the final rotor gives the single revolution in 12 hours necessary for the hour hand.

The hands of this strange clock are screwed to upright pillars, which are mounted on the rotors, and the hands pivot on a common bearing pin at the centre. The actual bearings of the rotors are of the sleeve form and the dial, which is of a transparent substance, forms a cover plate in addition. As the dial has necessarily to be pierced to accommodate the pillars of the hands, it is divided up into a series of rings, the pillars having clearance in the space between each ring and the next.

In the picture showing the dial in position the box below the actual clock contains the condensers and resistor unit which are used to produce the rotating magnetic field in the outer stator. The clock represents a distinct saving in wear, for the most rapidly moving part only rotates once per second. The balance wheel in watches and small lever clocks makes five swings per second and the rotors of most of the synchronous motor electric clocks revolve 200 times per minute, so that the speed reduction achieved by this new form is considerable.

The clock is not yet on the market, but having progressed so far, it should not be long before it is obtainable by the public. An interesting feature of the design is the fact that any speed can be given to the rotors of such a clock by varying the number of pole pieces, and this would seem to lend itself to many special uses. According to Messrs. L. W. Chubb and T. R. Watts, the research engineers who have developed the design, there is no theoretical limit to the slowness that could be obtained.

**The novel electric clock illustrated is an arrangement of concentric rotors and stators, no gears being employed**

## Sodium Light Beacons for Aerodromes

The latest use to which sodium lamps have been put is that of guiding the night flier. At the Waalhaven Aerodrome (Rotterdam) an air beacon utilising Philips's "Philora" sodium lamps has been installed. The lights are mounted on the top of the aerial control tower at a height of 84 ft., and the beacon can be seen by pilots at a distance of more than forty miles. The success of this installation has led the authorities of the aerodrome at Amsterdam "Schiphol" to have a similar installation carried out and four "Philora" lamps of 300 W each have been mounted on the aerial tower.

# Costing Bulk Supplies. By J. C. Petersen

## The relation between bulk-supply and retail tariffs

AS the resultant average costs of bulk supplies are determined, first, by the kW charge, and secondly, by the kWh charge, the relation between the two, or "load factor," must govern the situation. I have here adopted £3 5s. per kW and 0.2d. per kWh sent out. The figures are based upon the accounts of an undertaking with a demand of 5,555 kW and a load factor of 25 per cent. (kWh sent out); allowing 10 per cent. for conversion and distribution losses, the kWh sold is 10,950,000 and the kW sold at 25 per cent. load factor is 5,000.

The following is the summary of the cost account.

| | | | | |
|---|---|---|---|---|
| kW charge (5,555 kW sent out) ... | | | £18,054 = | £3 12 2 per kW sold. |
| Standing charges: | | | | |
| Rent, rates, taxes... ... | £14,000 | | | |
| Salaries, establishment, insurance, etc. ... ... | 12,000 | | | |
| Interest and sinking fund... | 38,000 | | | |
| | | 64,000 = | £12 16 0 per kW sold. | |
| Distribution charges ... ... | | 5,000 = | £1 0 0 per kW sold. | |
| | | £87,054 = | £17 8 2 per kW sold. | |
| | | = | 1.908d. per kWh sold. | |
| kWh charge (12,165,450 kWh) ... | | 10,138 | 0.222d. per kWh sold. | |
| | | £97,192 = | 2.13d. per kWh sold. | |

The overall cost is thus £17.4104 per kW, plus .222d. per kWh sold. Exception has been taken to, but there has also been agreement with, the method adopted of arriving at the figures of kW sold. It is possible to sell more kilowatts than purchased owing to diversity factor, but the reverse also may apply, that it is possible to pay for more kilowatts than is sold.

In the correspondence columns of the ELECTRICAL REVIEW of March 10th last, the difficulty of ascertaining diversity factor was pointed out. The writer showed that while a consumer might have a good diversity factor during the period of measurement of maximum demand this diversity might not be maintained during another period; an undertaking paying for kW at the Christmas peak and making out its accounts to consumers on a quarterly basis would pay for more kW than it charged for owing to fluctuations of demands in the other quarters.

If all consumers were charged on the m.d. system and the aggregate kW paid for annually were ascertained I might be tempted to use this figure as kW sold, but as in the case quoted there are numerous tariffs (*e.g.*, all-in domestic, rateable-value, flat, heating, power, outside-lighting, shop-window lighting) the diversity factor cannot be accurately ascertained. The kilowatts sent out at peak load and charged for are entirely governed by the consumer's maximum load at the same time. I have taken the ratio of kWh sent out to kW sold as being the same as that of kWh sent out to kWh sold,

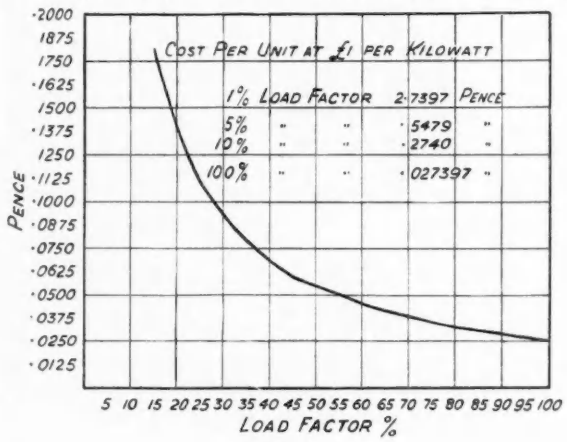



**Fig. 1**

thereby allowing diversity factor to take care of itself, which it automatically does in the revenue return and in the subsequent result as between revenue and expenditure.

Undertakings generating electricity on behalf of the Central Electricity Board will keep their costs accounts as usual for the purpose of making out the "O.R.3" returns and also for comparative purposes. In making any comparison, consideration must be given to the fact that, owing to the operation of the Board, capital charges on new plant that would be necessary owing to the growth of the undertaking will be saved and this factor will become more and more apparent as time goes on.

Fig. 1 shows the average cost per kWh at various load factors at £1 per kW. Since there are 87.6 kWh per annum per kW at 1 per cent. load factor the cost per kWh is 2.739d. and the average cost at any load factor can be ascertained by dividing 2.739 by that load factor. Fig. 2 shows the overall cost, and this curve can be further augmented for analytical purposes by introducing lines showing the effect of the kW charge, management charges, distribution charges, and interest and sinking funds.

If a group of present industrial consumers takes 1,000 kW at 100 per cent. load factor, according to fig. 2, the cost would be .699d. per kWh, whereas at 25 per cent. load factor

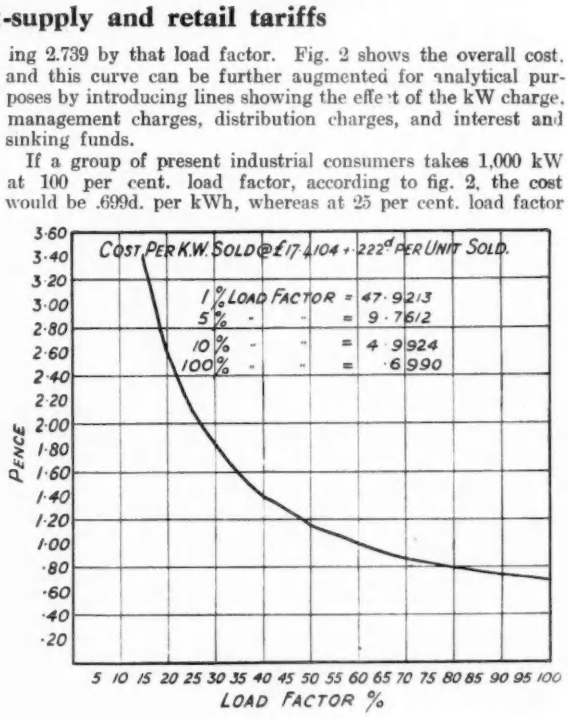



**Fig. 2**

the cost is 2.13d. per kWh, to which an addition must be made for profit. Statement No. 1 shows the results at 25 per cent. load factor and Statement No. 2 the result of supplying 1,000 kW at 100 per cent. load factor, and the remaining 4,000 kW at 25 per cent. load factor (average 40 per cent. load factor), the effect of which is that the revenue has been reduced from 2.186d. to 1.458d. per kWh sold and the cost from 2.130d. to 1.415d. per kWh sold, the surplus being increased from £2,544 to £3,150 owing to the increased output and higher load factor.

STATEMENT No. 1.

| | | | Pence per kWh Sold. |
|---|---|---|---|
| REVENUE. | | | |
| 10,950,000 kWh ... ... ... ... ... ... | | £99,736 | 2.186 |
| EXPENDITURE. | | | |
| 5,555 kW sent out @ £3 5s. ... ... ... | £18,054 | | |
| 12,165,450 kWh sent out @ 0.2d. ... ... ... | 10,138 | | |
| Distribution and Standing Charges ... ... | 69,000 | | |
| | | 97,192 | 2.130 |
| SURPLUS ... ... ... ... ... ... | | £2,544 | .056 |

STATEMENT No. 2.

| | | | |
|---|---|---|---|
| REVENUE. | | | |
| 4,000 kW @ 25% load factor, 8,760,000 kWh @ 2.186d. | £79,789 | | |
| 1,000 kW @ 100% load factor, 8,760,000 kWh @ 0.730d. | 26,645 | | |
| 17,520.000 | | £106,434 | 1.458 |
| EXPENDITURE. | | | |
| 5,555 kW sent out @ £3 5s. ... ... ... | £18,054 | | |
| 4,444 kW @ 25% load factor 9,732,360 | | | |
| 1,111 kW @ 100% load factor 9,732,360 | | | |
| kWh sent out @ 0.2d. ... 19,464,720 ... | 16,220 | | |
| Distribution and Standing Charges ... ... | 69,000 | | |
| | | 103,274 | 1.415 |
| SURPLUS ... ... ... ... ... ... ... | | £3,160 | .043 |

I do not suggest that the 1 per cent. load factor consumer should be charged 47.92d. per kWh plus a margin of profit. Maximum price is governed by Clause 32 of the Electric Lighting Clauses Act of 1899, and a standing charge should be made to unprofitable consumers. I hold that bulk supply tariffs to be equitable must bear a direct relation to retail tariffs; therefore, any tariffs based on load factor cost, no matter in what form they are presented to the consumer, will meet the case.

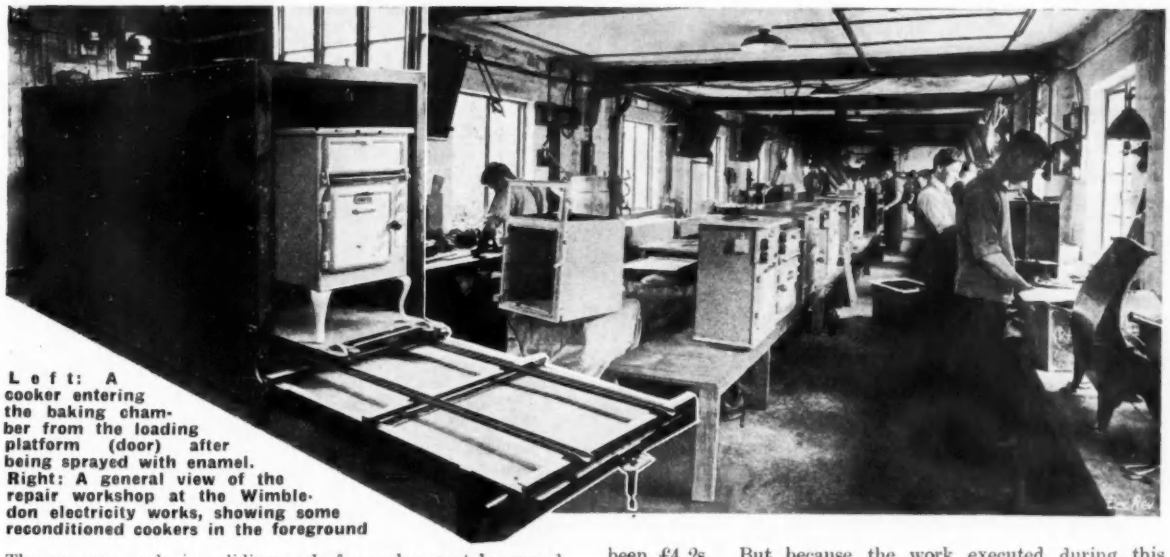
### Conditions in Czechoslovakia

The bulk of British manufactures only requires pushing in order to command a market in Czechoslovakia, states a Department of Overseas Trade report on economic conditions in that country. The existence of so many trade restrictions in foreign countries has seriously reduced the volume of trade and caused Czechoslovakia also to impose a large number of restrictions. The general opinion prevails that export business interests are best served by the maintenance of the "most favoured nation" principle.

# Cooker Reconditioning

## Some details of the Wimbledon scheme

ARISING out of the comments by Mr. A. E. McKenzie, M.I.E.E., chief engineer and manager of the Wimbledon Electricity Department, at the I.M.E.A. convention, there have been numerous inquiries for information regarding his cooker-reconditioning plant, and we have therefore obtained the following particulars of the scheme. Wimbledon was faced with about 2,800 black cookers out on hire and something like thirty requests per week for changes; the introduction of enamelled gas cookers made the problem more pressing.



**Left: A cooker entering the baking chamber from the loading platform (door) after being sprayed with enamel. Right: A general view of the repair workshop at the Wimbledon electricity works, showing some reconditioned cookers in the foreground**

The generous reducing sliding scale for cooker rentals proved insufficient, and the cost of vitreous enamelling was prohibitive.

The desire to stove-enamel returned cookers materialised with the "discovery" of enamels that would withstand 400 deg. F. "Foochow" paints, introduced by Donald Macpherson & Co., Ltd., were decided upon, and the scheme outlined in our issue of June 16th (page 872) was adopted.

A stoving oven which has now been in operation for about six months was built by the undertaking at an overall cost of £58. It accommodates three large cookers and measures internally 12 ft. long, 4 ft. 6 in. high, and 4 ft. wide. It is constructed of exterior and interior sheet-iron on an angle-iron frame, with 3 in. of silica wool lagging all round. A drop-down hinged door occupies the whole of one end and is secured in the closed position by wing nuts and clamps. A pair of rails along the floor and continued on the inside of the door, which is used as a loading platform in its lowered position, carries special low four-wheeled trollies on which the cookers are mounted. There is a rail along the centre at the top of the chamber for the suspension of small parts. Two adjustable vents in the roof of the oven allow paint fumes to escape, and three thermometers are fitted in one side.

The equipment is electrically heated, and on the floor beneath the rail level and expanded-metal protection there are six 2-kW banks of elements, each three-heat controlled, and consisting of eight 250-W mica-formed resistors mounted on porcelain insulators. The whole is wired with No. 12 iron wire. The installation is designed to operate at from 375 to 400 deg. F.

### The Method of Procedure

For reconditioning, the cooker is first dismantled and stripped, after which the parts are put into a hot potash bath for twenty minutes' treatment to remove all paint and grease. About 28 lb. of potash is used with 60 gallons of water in a special tank in which the mixture is steam-jet heated to about 200 deg. F. This mixture lasts for about a week and deals with from twenty to thirty cookers. Upon leaving the bath the parts are sprayed with grey enamel, and after twenty minutes' partial drying they are "splattered" by a special gun in white to give the mottled effect.

Twenty minutes' baking is the next process, and, after cooling, clear lacquer is sprayed on prior to a second twenty minutes' cooking. There is a brighter look about the enamelling after two stovings, said Mr. H. C. Allen, the undertaking's domestic engineer, who has been largely responsible for the development of the plant, and to whom we are indebted for help in the collection of this information. This method of stove-enamelling is also very effective for vitreous enamel, and many vitreous-enamelled cookers are being treated. Fires, water heaters, and wash-boilers are also dealt with along similar lines. Up to and including potashing the processes in the new method of reconditioning are exactly the same as those employed in the old method.

Before the installation of the enamelling plant the average cost of reconditioning a black cooker (that is, repainting black) was £3 16s., including various new parts. The average cost of stove-enamelling over the first six months' working has been £4 2s. But because the work executed during this period has been partly experimental it is confidently expected that the figure will be reduced by 2s. Thus, for an additional 4s. per cooker the problem of reconditioning the returned cooker, which has proved very troublesome in many quarters, has been solved by this particular undertaking. We consider that this is of vital importance and interest to all those who are really concerned with load building. It should be stressed that the cooker hobs are not stove-enamelled and that the reconditioning figure given (£4 2s.) includes the cost of vitreous-enamelling the hob—from 7s. to 10s.

On May 31st last the undertaking had out on hire 4,438 cookers, 746 of which were sent out during the previous four-

**The arrangement of the elements on the bottom of the oven**

teen months. Our thanks are due to Mr. McKenzie for permission to secure and publish the above information and the accompanying photographs.

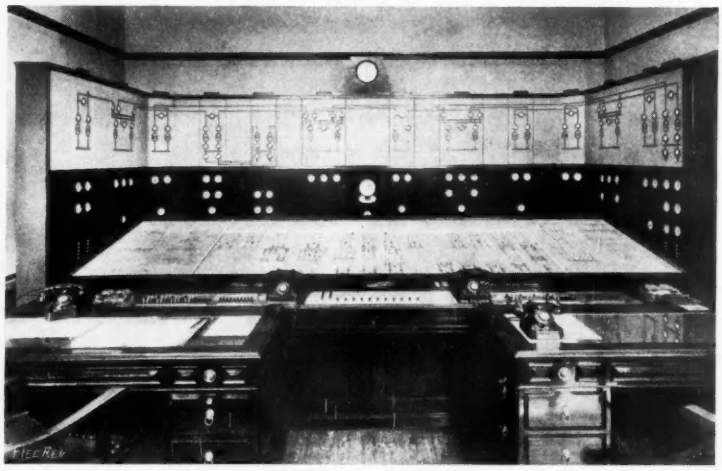
### A Russian Electric Locomotive Factory

To meet orders for electric locomotives required for the lines to be electrified under the second Five-Year Plan, a new factory is being erected at Kashira, near Moscow, which when completed will have an annual capacity of 1,200 locomotives, the electrical equipment of which will be constructed at the Dynamo Works, Moscow. According to present intentions, 4,000 electric locomotives will be required by the beginning of 1938, but many of these will be constructed at the Kolomna Works.

# A Grid Supervisory Scheme

THE system of remote metering, switch indication, telephony, and signalling now in operation in the Mid-East England Area of the Central Electricity Board's scheme comprises a central control room at Grid House, Leeds, together with equipment at each of thirteen power and transforming stations and eleven secondary stations. Constant total rotary remote control equipment is employed for conveying the signals from one station to another.

In the central control room (illustrated) is a system diagram with automatic light indicators of the positions of all 132-kV and certain lower-voltage circuit-breakers and transformer taps, together with meter indicators. Control of the system has been concentrated in the control desk which, occupying the centre of the room, includes a miniature system diagram, station generator panels, boiler indicators, together with telephone signalling keys and routine instruction sending equipment common to all stations. The desk diagram includes direct indication for those circuit-breakers and transformers which are automatically indicated, and manually operated indication of all other isolators, earthing switches, and low-voltage circuit-breakers connected with the transmission system.



The central control room of the Mid-East England Area

The principle of code impulsing, using a constant total of impulses to form a code, is very reliable, its great advantage lying in the fact that unless the correct total is achieved the signal is not indicated. Thus any interference on the lines cannot cause the equipment to function incorrectly, and the control engineer can operate with the certain knowledge that every signal sent and received must be the correct one.

The robust power-driven multi-contact rotary switches used are very similar in principle to the ordinary drum-control auto-telephone switch. The most important of its advantages over the self-interrupting type of switch is that the power drive imparts a smoother motion to the switch and enables heavier pressures to be adopted for the wiper brushes. Among the facilities provided are the remote indication of tap positions of twenty-six transformers, positions of sixty oil circuit-breakers, and readings of fifty meters. Also, the routine instruction sending equipment enables the control engineer to send regular instructions, such as "Raise load," "Lower load," &c., to each of eleven stations. This sending can be done either collectively or individually in any combination, and it is therefore possible for the central control engineer to raise the frequency of the whole system simultaneously, or, if the transmission system is sectionalised, of any section as required.

Telephone facilities enable the control engineers to converse with any power station over the same lines as are used for the supervisory signalling. Central control can call any telephone on the system and be called from any distant power station, the telephone switching arrangements being of a very simple type. Key switching and lamp and bell signalling have been used. Where secondary power stations are connected *via* the main power station for telephone communication to central control, small automatic telephone exchanges have been supplied at the main power station for providing the interconnections required. The telephone connections at the control station can be extended to the administrative offices as desired, whilst an additional facility is that a main power station can be connected through to another main power station *via* the switching arrangements at the Leeds control room. The engineers at the central control or the operators at the power stations may exercise a priority call in an emergency.

Remote metering has been accomplished by using the "Standard" 49-point remote metering system, which enables the central control to obtain, at any time, meter readings of the load "import" or "export" from the Central Electricity Board's transmission system, of the voltage at selected points on the system, of the transmission loads over certain low-voltage feeder lines between selected power stations, and of the total generator load at certain main generating stations.

Two line wires only connect the central control station with each main power station, the lines being rented from the General Post Office. Protection of these lines from the danger of connection to any high-voltage circuits in the power station has been adequately catered for.

The equipment was designed, manufactured, and installed by Standard Telephones & Cables, Ltd., in co-operation with the British Thomson-Houston Co., Ltd., the consulting engineers being Messrs. Merz & McLellan.

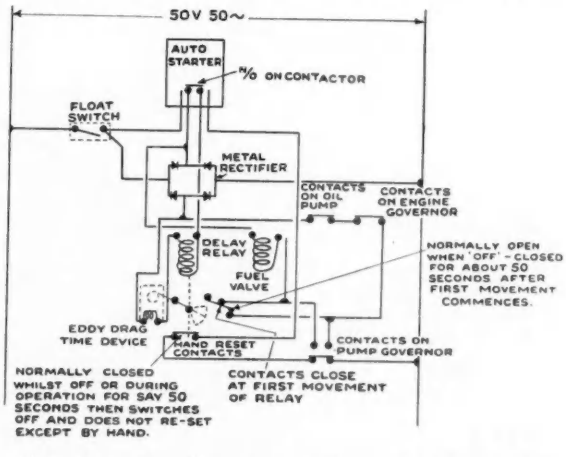
# Automatic Sewage Pumping

INSTEAD of employing the usual method of starting up automatically by a d.c. motor supplied by a battery, which method was not considered sufficiently reliable, the two engines of the automatic pumping sets of the new Hadleigh (Suffolk) sewage pumping scheme are started by a.c. from the public mains.

Each automatic set consists of a three-phase slip-ring motor, supplied by Lancashire Dynamo & Crypto, Ltd., coupled through a Wellman-Bibby equipment to the horizontal shaft of a vertical single-cylinder crude-oil engine (supplied by the New Pelapone Co., Ltd.), which in turn drives one of the two "stereophagus" 3-in., 80-gal. per min. (25-31 ft. head) pumps. These sets are also arranged for crank-handle starting, and there is also a larger hand-started set serving a 4-in., 250-gal. per min. (37 ft. head) pump of similar make. The pumps are placed 17 ft. below the engine-room floor, and are driven by vertical shafts through bevel gears.

An auxiliary d.c. supply from a metal rectifier operates the solenoid of the fuel valve of each automatic set, the circuit being interrupted when the engine is at rest by a switch controlled by pressure from the lubricating oil pump, and a change-over switch actuated by a centrifugal governor on the vertical pump shaft, which is short-circuited during the starting period by a switch on the timing device.

When the sewage in the sump rises to starting level a float switch makes the circuit of the automatic motor starter, and also that of the metal rectifier which serves a timing relay,


50V 50~
AUTO STARTER
% ON CONTACTOR
FLOAT SWITCH
METAL RECTIFIER
CONTACTS ON OIL PUMP
CONTACTS ON ENGINE GOVERNOR
DELAY RELAY
FUEL VALVE
NORMALLY OPEN WHEN 'OFF' - CLOSED FOR ABOUT 50 SECONDS AFTER FIRST MOVEMENT COMMENCES.
EDDY DRAG TIME DEVICE
HAND RESET CONTACTS
CONTACTS ON PUMP GOVERNOR
NORMALLY CLOSED WHILST OFF OR DURING OPERATION FOR SAY 50 SECONDS THEN SWITCHES OFF AND DOES NOT RE-SET EXCEPT BY HAND.
CONTACTS CLOSE AT FIRST MOVEMENT OF RELAY

Method of automatic control of oil-engine driving pump

# Some Municipal Electrical Engineers

From left to right: Mr. J. B. Feltham (*Elliott & Fry*), Mexborough; Mr. T. Gerrard, Mirfield; Mr. R. L. Hewling, Skelton; and Mr. A. Pickersgill (*Elliott & Fry*), Spenborough

## Automatic Sewage Pumping (*concluded from opposite page*)

with an eddy drag time device and the fuel valve. A short movement of the armature of the time device makes contact, and a few revolutions of the engine brings up the lubricating oil pressure and closes the oil switch. At about 300 r.p.m. contacts on the engine governor are closed, thus completing the d.c. temporary circuit for the fuel-valve coil and so opening the valve and allowing the engine to fire. At about 600 r.p.m. the centrifugal clutch of the bevel gear shaft begins to drive the pump shaft, the motor assisting the engine up to its full speed of 720 r.p.m. The engine then takes the load, and when the synchronous speed of the motor is reached (750 r.p.m.) the centrifugal governor on the pump shaft, which is then running at 1,110 r.p.m., operates the change-over switch, making the main fuel circuit and breaking the starting circuit which resets ready for the next start.

The d.c. circuit remains closed as long as the engine is running. If the lubricating system fails, or the speed of the engine falls below 1,080 r.p.m. from any cause, the circuit is broken and the set shuts down. In this case the float switch remains closed and the whole process of starting is gone through again. If the set then fails to attain the correct speed within 60 secs. the armature of the relay completes its movement and breaks the starting circuit, after which the set will make no attempt to restart until the push button on the main starting panel has been reset by hand.

The float switches are actuated by copper floats and standard direct-acting ropeless mechanical gear produced by Pulsometer Engineering Co., Ltd., who were the contractors for the pumping equipment. The electrical starting gear was supplied by the Watford Electric & Manufacturing Co., Ltd.

On test it was found that when slightly warm, as during normal running, the engine took charge in seven seconds. With the engine cold, after standing a whole night in cold weather, it took charge in about thirteen seconds. The population of Hadleigh urban district is about 3,500, and the dry-weather flow of sewage is estimated at 15 to 20 gal. per head per day.

Messrs. Taylor & Wallin were responsible for the scheme as a whole, and Mr. H. C. Booth acted as consulting engineer for the electrical and mechanical work.

# An All-welded Test Bridge

IN this country and abroad a great deal of repair work by welding has been carried out on bridges, though comparatively little has been done as regards the complete welding of a new bridge structure Some interest, therefore, is attached to an all-welded test bridge erected by the Swiss Federal Railways. A "through" bridge of 52-metre (170ft.) span was selected as a typical example for investigation.

In preparing the design, which was drawn up on most advanced lines, two outstanding principles were: (a) That all cross girders, rail bearers and main girder members should be built up from plates and flats, thus eliminating rolled steel sections as far as possible. This not only resulted in simplifying the connections, but also permitted infinite scope in placing and proportioning the steelwork to its best advantage. (b) That all joints should be butt-welded (rather than lapped) to avoid complicated stresses at the connections, and to economise further in materials As, however, these principles had not so far been developed to any extent in practice it was decided as a preliminary trial to construct a full-scale section of the bridge for testing under normal working conditions.

This test section consists of two sets of longitudinal rail bearers supported at their outer ends on the abutments and in the centre by a cross girder. The latter is supported at one end on the abutment and at the other end by an exact replica of the centre panel web joint in the main lattice girder of the complete bridge. Both the cross girder and the rail bearers were built up from plain flats and plates (varying from 10 to 25 mm. in thickness). This method of construction allowed considerable freedom in design for varying the ratio of width to thickness in the flanges and in determining the most efficacious depth of the girders.

The plates were prepared carefully for butt welding and the slight additional cost more than outweighed the cost of extra welding consequent on careless preparation. The electrodes used were of the Quasi-Arc type and the total consumption amounted to 3,400 (No. 10 and 8 uranium). The total welding time amounted to 1,100 man-hours, 900 in the shops and 200 in erection.

As will be appreciated, a test section of this type does not provide favourable conditions for comparing the costs of welded *versus* riveted bridge construction, but although the cost per unit weight was slightly higher, the overall cost was very much in favour of welding owing to the fact that there was a saving of 24 per cent. in material. The amount of welding per ton on the test section is considerably higher than would be the case for the complete bridge. The test section was erected in a busy section (single track) on a gradient of about 1 in 40. About sixty-five trains pass per day and two locomotives are required for ascending trains. During the first 18 months' service of the test section about 21,000 trains passed over it. It has, however, been decided to keep it in position for two years and to inspect it carefully at regular intervals. At the end of this period comprehensive stress tests will be carried out under traffic conditions. The section will then be removed from the track and loaded to destruction, while specimens will be cut from each joint for separate examination and testing.

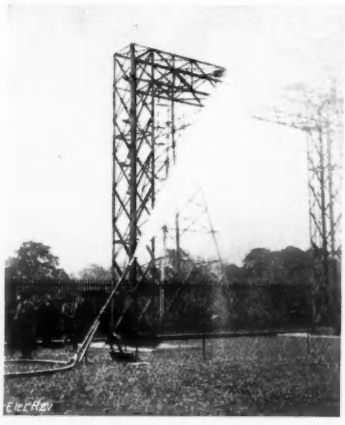
**An electric tug recently launched at Aberdeen**

# Water-jet Conductivity

WE give below some technical particulars of the tests recently carried out at the Croydon grid sub-station to ascertain whether firemen would be endangered if they allowed "solid" jets of water from their hoses to impinge on a 132-kV line.

The water was taken from a hydrant by two parallel 400-ft. hose pipes connected by a Y junction, and the nozzle was fed through a 10-ft. straight junction, which reduced the tendency of the jet to break up into spray.

After the first two tests a second voltmeter was connected between the nozzle and another point in the sub-station earthing system. In the following table, column (4) gives the resistance of the voltmeter (or two voltmeters in parallel) across which the voltage drop in column (3) occurred. The specific resistance of the water was 2,100 ohms per cu. cm.



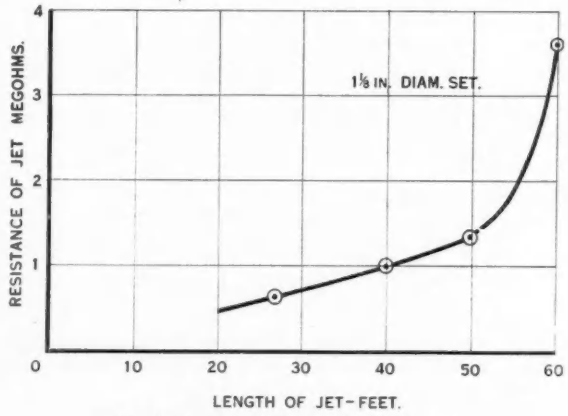
**The tests in progress**

| Length of Jet, ft. | Dia. of Nozzle, in. | Max. V. between Nozzle and Earth. | Resistance of Voltmeter, ohms. | Resistance of Water Jet, megohms. | REMARKS. |
|---|---|---|---|---|---|
| 60 | 1⅛ | 3.5 | 180 | 3.5 | Resistance between nozzle and earth (hose full), 1,590 ohms. |
| 50 | 1⅛ | 9 | 180 | 1.37 | |
| 40 | 1⅛ | 18 | 273 | 1.0 | |
| 27 | 1⅛ | 40 | 438 | 0.65 | |
| 27 | ¾ | 12 | 438 | 2.2 | Water pressure 140 lb. per sq. in. |
| 27 | ⅝ | 0 | 438 | Very large | Water pressure 100 lb. per sq. in. Resistance between nozzle and earth 1,600 ohms. |
| 27 | London control ½ (spray) | 0 | 438 | Very large | |
| 27 | 1⅛ | 48 | 438 | 0.55 | |
| 25 | 1⅛ | 20 | 438 | 1.3 | Straight junction not used. |
| 22 | 1⅛ | 80 | 438 | 0.33 | |

The values of the voltages in column (3) vary with the resistance of the voltmeter. The resistance of the water jet has been deduced from the following formula

$$V = \frac{E}{I + R_1\left(\frac{1}{R_2} + \frac{1}{R}\right)}$$

where V is the voltmeter reading, R the resistance in ohms of the voltmeter (or voltmeters in parallel), $R_1$ the resistance in ohms of the water jet, $R_2$ the resistance in ohms between the nozzle and earth when the hose is full of water, and E the voltage to earth of the power line.



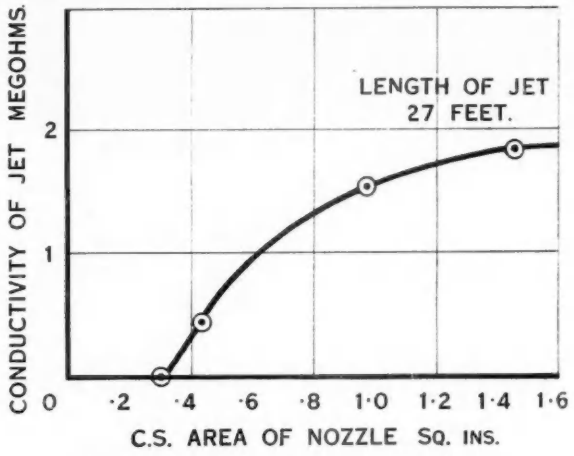

**The influence of the length of the jet**

Tests 1 to 4 show the effect of varying the length of the jet, with constant nozzle diameter, the resistance of the jet being directly proportional to its length up to about 50 ft., when it begins to break up into a spray and the resistance increases rapidly. The value of the jet resistance (on the straight portion of the curve) is about twice the value calculated for a uniform circular cylinder of water; this is due to: (1) the whole cross-section of the jet not making contact with the conductor (diameter 0.77 in.); (2) a certain amount of breaking up; and (3) the jet being probably slightly constricted outside the nozzle.

Tests 4 to 8 show how the conductivity of a jet of constant length varies with the cross-sectional area of the nozzle. The conductivity of the ⅝ in. nozzle is very small, but increases rapidly as the stream of water becomes more "solid." For the nozzles over 1 in. in diameter the conductivity does not increase so rapidly with the area of the nozzle as a larger proportion of water fails to make contact with the conductor. The measured resistance between the hose nozzle and earth (1,500 to 1,600 ohms) is much lower than the calculated value of the resistance of the water columns in the hoses owing to the relatively low resistance to earth of 800 ft. of canvas hose.

## Danger of Shock

If the voltmeter were replaced by a man the current flowing through him would be $I = \frac{E}{R\left(1+\frac{R_1}{R_2}\right)+R_1}$ amperes where R ohms is now the mains resistance to earth. The resistances R and $R_2$ are so variable that no very definite conclusions can be drawn from this formula. If R is 10,000 ohms and $R_1$ and $R_2$ 1 megohm and 1,600 ohms respectively, then the current flowing through the man will be 11 mA, the resistance of the water being 2,100 ohms per cu. cm. If water having a lower resistance is used the current will increase, but will never be greater than 12.5 mA.




**Conductivity with various nozzle diameters**

The conclusions are that no special precautions need be taken when working at 40 ft. or more from a 132-kV line with nozzles having a diameter of ⅝ in. or less. For nozzles having a diameter of ¾ in. or more the distance should be at least 60 ft. At shorter distances, although there will usually be no serious danger, it is advisable to connect the nozzle of the hose to earth, or to use a hose having a copper wire running throughout its length and bonded to the nozzle and the hydrant, or to use a nozzle covered with an insulating material such as "Bakelite," or alternatively, to hold the ordinary type of nozzle with rubber gloves. The tests were carried out in the presence of the president and members of the Institution of Fire Engineers and of members of the technical staff of the Central Electricity Board.

## A 300-kV Travelling Cable-testing Plant

The Siemens & Halske Co., of Berlin, has recently completed for the Compania General de Industrias y Transportes, of Buenos Aires, what is stated to be the highest-powered travelling cable-testing outfit so far constructed, it being designed for testing cables up to 300 kV to earth. The outfit comprises three road vehicles, the hauling tractor, a large four-wheel covered trailer containing the transforming apparatus, and a smaller trailer equipped with a power-generating plant, the latter consisting of a 16-h.p. four-cylinder petrol engine coupled to a 10-kVA alternator. The equipment of the large trailer comprises a transformer, two condensers, a mercury rectifier, and special switchgear.

# A Novel Tramcar

IT will be seen from the accompanying illustration that the new electric tramcar designed by Mr. W. Luff, Blackpool's transport manager, is quite unlike any other in this country. It is intended for the Blackpool-Fleetwood service, and its stream-lined shape gives it a handsome appearance.

Besides the normal windows, two of which on each side drop down, and a large number of ventilators in the side facia panel, plate glass side eaves are provided and the roof is made to slide back at each end. The car is thus of the single-deck observation type, and while providing full weather protection is very well ventilated and affords an uninterrupted view sideways and upward, which should be specially appreciated during the annual illuminations.

There is a central entrance doorway on each side and passengers step straight on to the platform. In the vestibule are spring-loaded tip-up seats for four passengers, and the saloons on each side accommodate twenty-four passengers each. The transverse reversible seats have rubber cushions and are upholstered in green moquette and leather. The totally enclosed driver's cab at each end has an exterior door on the offside and a rear one to provide access to the saloon.

The overall height of the vehicle is less than 10 ft. It is mounted on two equal wheel bogie trucks and has been constructed of rolled steel sections and teak, the underframe being welded. The total length is only 40 ft.

Tubular electric heaters controlled by the driver are installed at each side of the car. A rectangular glass panel fitting illuminates the vestibule and entrances, while convex glazed frames extending the full length on both sides of each saloon enable passengers to read in comfort without glare.

The front of the car is similar to that of a motor car. A spring steel fender is provided, and there are two headlamps and two adjustable windscreens, each fitted with an electric wiper. Directly lighted destination indicators are fitted at each end and also over the entrance doors. The hand brakes are actuated by a vertically operated wheel; in addition, air brakes act on all wheels. Special consideration has been given to the springing; the axle boxes are of the semi-spherical roller bearing pattern, and "Silentbloc" bushes minimise the noise usually associated with the use of equal wheel trucks.

The two bogies are each driven by a single E.E.305 motor of 50 h.p. at 500 V, controlled in series-parallel and driving through spur gearing directly on to one axle of each bogie. They are fitted with patent constant level lubricators. The controllers have four series, four parallel, and eight brake notches. They are of the "Z" pattern with mechanical interlock between the driving handle and reverser. The principal feature is the division of the contacts into those which break and those which carry current. One of the breaking contactors is in line on the power side and the other on the break side; the remainder of the contacts, including those for cutting out resistance in steps, are made on a power cylinder of the drum type fixed to the same shaft as the cams that operate the line contactors. The reversing drum is of standard type, and below it is a brake power change-over switch. Current is collected from the overhead wires by a patented pantograph mounted on the roof of the tramcar, constructed according to railway practice.

This tramcar, the body of which is of registered design, was built by the English Electric Co., Ltd., the trucks having been manufactured at the company's Dick, Kerr works, Preston, and the electrical equipment at its Bradford works.

**The new Blackpool stream-lined tramcar**

# Rural Electrification Experience

AT the Farmers' Electrical Conference arranged at the Royal Agricultural Show, Derby, on July 6th, by the British Electrical Development Association, a paper was read by Mr. S. E. Britton, city electrical engineer of Chester, on "Five Years' Progress in the Electrification of Agriculture round Chester."

Mr. Britton stated that agriculture could not afford to do without electricity. The farmer who was not connected with a public electricity supply undertaking could not conceive the value electricity could be to him and the extent of the loss that he suffered without it. From experience in supplying electricity to upwards of 300 farms he was definitely of opinion that agriculture could afford to pay for electricity the price at which any well-established supply authority could afford to supply it. The method he had mainly adopted was to offer to equip farms electrically for a definite period without obligation on the part of the farmer to pay unless the equipment produced the stipulated results. No apparatus supplied under such conditions had been returned.

Mr. Britton's views on the economics of electricity as applied to agriculture were as follows:—When a public supply of electricity was used on a farm the usual amount of business could be done in a shorter time and at a reduced expenditure, or a greater amount of business could be done without exceeding the expenditure upon the older methods. No matter to what practical purpose electricity was put on a farm it saved the farmer as much as he paid for the electricity consumed.

With electric light about 100 additional working hours per annum were obtained from each employé. Electric light was virtually essential to the production of Grade A milk and it was of great help in attending to sick animals. Electric milking effected a saving in labour of 30 per cent. The overall economy of electricity in driving barn machinery was about 50 per cent., as compared with other forms of power. Pumping water, which was one of the most disliked tasks on a farm, was carried out electrically at a fraction of the cost of pumping by hand. Radiant electric heat reduced the mortality of young pigs. Electricity for incubators, foster mothers and lighting was now considered the most satisfactory agent on poultry farms with upwards of 2,000 head, and was indispensable where greater numbers were kept.

When hot water in quantities was required, electricity at ½d. per kW (the price charged in the Chester district) showed an economy on the cost of coal. The absence of coal, dirt, attention, and labour brought further material advantages. Electricity in the homestead was invaluable. When applied to the dairy it enabled a maid to be dispensed with throughout the year. The resultant saving in wages and keep would more than meet the cost of electricity.

As an appendix to his paper Mr. Britton gave the personal opinions of a number of farmers who had used electricity to an increasing extent for several years and spoke with enthusiasm of its economies and the improvement it had brought in both the quality and quantity of production.

# Cleansing Flue Gases

IN one of the papers presented at the Chemical Engineering Group session of the annual meeting of the Society of Chemical Industry, which is taking place at Newcastle-on-Tyne this week, Mr. G. W. Hewson, Dr. S. L. Pearce, and Messrs. A. Pollitt and R. L. Rees describe the application to the new Battersea generating station of the London Power Co., Ltd., of the results of researches conducted during the last four years into the elimination of noxious constituents from boiler flue gases, and the treatment of the resulting effluents.

The first half of this long and detailed paper is an account of the development of a process of removing sulphur oxides from flue gases, which may be summarised as follows. The gases are washed during their passage through scrubbers in which both gases and water come into contact with iron oxide. The gases are then scrubbed, preferably in contra-flow, with water in another chamber, the scrubbers being made of an inert material such as wood. After passing upwards through the water sprays, the gases enter a final scrubber which is wetted with an alkaline solution, for example, 0.25 per cent. chalk slurry. The gases next pass through a dry scrubber, which removes entrained moisture, and are finally discharged to atmosphere. The alkaline solution flows downwards and mingles with the water from the sprays.

About 20 tons of water and 10 to 12 lb. of lime or chalk are used per ton of coal burned, at a cost (for pumping and alkali) of about 3d. per ton of coal. In this way about 90 per cent. of the oxides of sulphur can be removed from gases derived from coal containing 0.8 to 1.0 per cent. sulphur.

Entrained air bubbles are produced in the wash water by brisk aeration and the effluent from the whole plant is also aerated to oxidise sulphites. The total reducing power of the effluent may thus be made equivalent to as little as three grains of sulphur per gallon, in the form of sulphite. A very small amount of manganese in solution will promote oxidation still further. After filtration the effluent is diluted with about 25 times its bulk of return condensing water, which is sufficiently alkaline to neutralise the acidity of the effluent.

### The Battersea Plant

The authors also outline the results obtained by re-circulating alkaline solutions through the washer, refer to the more important methods of analysis involved in the investigation, and describe the gas washing plant actually installed at the Battersea station, the total capital cost of which has amounted to £246,400. The Battersea plant is designed to treat the gases from a battery of nine boilers which constitute the first half of the station. Each of the first six of these boilers is of 250,000 lb. p.h. n.e.r.; or 312,000 lb. p.h. m.c.r.; or 330,000 lb. p.h. peak rating. They are identical and arranged in a row along one side of the boiler house, the main flue of which runs above the boilers. Each boiler has four induced-draught fans, which operate in parallel; there will therefore be a row of thirty-six i.d. fans all discharging into the main flue when the present scheme is completed. With seven units steaming the coal consumption will be 133 tons per hour, producing a total weight of gas of 3,600,000 lb. per hour.

Working temperatures have had to be very carefully considered in the selection of special materials to withstand the corrosive action of the gases, wash water, and effluent, as some of these materials have a low melting point. The i.d. fans draw the gases through the boilers, super-heaters, economisers, and air heaters into grit arrestors, which discharge into primary scrubber chambers. Herein river water is sprayed into the gases, causing any residual solids that have escaped through the grit arrestors to be precipitated, and discharging the wet gases into the main flue in the form of a fine mist.

### The Final Processes

The main flue runs the complete length of the station, with a chimney tower at each end. The floor of the flue is awash with water, thus providing the maximum amount of water vapour for wetting the gases and also forming a settling area for the heavier grits, which can be sludged out and allowed to drain dry on the roof of the turbine house. In the main flue are ten banks of scrubbers, with sprays producing a curtain effect. The gases then pass to the two chimney towers, each of which consists of three sections, a central downtake and two side uptakes. The gases pass down the centre, bifurcate at the bottom, then ascend the two outer chambers and pass through eliminator plates to the base of the chimney proper. In the chimney towers are three more sets of scrubbers, placed horizontally and vertically. Thus there are five distinct banks of scrubbers, the alkaline wash being sprayed on to the fifth and last bank.

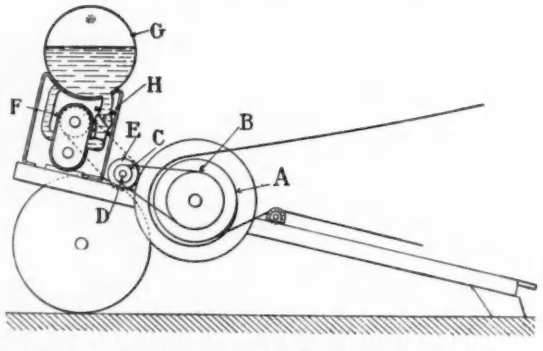
At the top of the chimney tower is the eliminator, which removes the free moisture entrained in the gases. Warm air from the boiler house is introduced into this chamber to dilute and assist the drying and dispersal of the gases. Above the eliminator is the chimney proper, 171 ft. high, the top of which is 337.5 ft. above ground level.

Many problems are still outstanding, the matter being more complex than it appears at first sight, and a considerable amount of research will be necessary before it can be thoroughly understood. Knowledge of the kind needed can only be gained safely by full-scale tests. Indeed, it is doubtful whether this process would ever have been considered practicable had the decision rested upon the results of laboratory work.

# The Erection of H.P. Transmission Conductors

THE hydraulically braked capstan shown in the accompanying illustration, from the *Revue Générale de l'Electricité*, is recommended by M. P. Crussard for use in the stringing of conductors on h.p. transmission towers. The particular object in view is to prevent the conductors being dragged along the ground, at the same time avoiding the trouble and expense of providing bundles of brushwood or trestle-mounted rollers between the towers.

A flexible steel haulage rope is passed over pulleys on the towers and attached to the conductor by a flexible sleeve grip. As the haulage rope is wound in by a capstan, the conductor is pulled from its reel into position on the towers. The tension in the conductor, and therefore the sag of the latter, can be regulated by appropriately adjusting the braking of the reel.




**A hydraulically braked capstan for overhead line erection**

As a band brake or similar frictional brake is inapplicable because of the considerable amount of power to be dissipated, the provision of the necessary braking force can be effected by hydraulic means with a high degree of uniformity and without rapid wear of parts.

In a particular case three aluminium-steel conductors of 0.368 sq. in. section and an earthing wire of 0.193 sq. in. section for a 150,000-V line were erected by direct haulage from reels mounted on a special braking carriage. The rotating reel drove, through chain and sprocket gear, a hydraulic brake of the piston and regulable vent type. There are two disadvantages in this "direct" method; first, the mounting of the conductor reel in the spider attached to the chain sprocket is somewhat tedious; secondly, the pull on the conductor leaving the reel comes on the underlying turns and may damage them, particularly if the conductor is wound at all loosely on the reel.

These objections can be overcome by the use of the braked capstan illustrated. The conductor reel is mounted freely on a simple trestle, and the conductor is taken three or four times round the capstan drum A, before being joined to the haulage rope. A chain wheel B on the capstan spindle drives the pinion C on the countershaft D. An emergency band brake operated by hand is mounted on D, which also carries a clutch and pinion E driving the chain wheel on the brake F. The brake comprises two rotary pumps which circulate oil from and to a reservoir G through a regulable valve H, which controls the braking force on the capstan.

This arrangement eliminates all possibility of nipping the wire on the reel; and compression springs between the brake capstan and its shaft maintain a steady pull on the erected conductor by absorbing any momentary irregularity in the haulage. The truck carrying the capstan is mounted on pneumatic tyres and can be towed as a trailer by any car or lorry.

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

### The Reorganisation of E.D.A.—and After

The majority of your readers will, I think, heartily agree with most of the points made by "Candidus" on page 947 of your issue of June 30th. The nine points he makes as summarised under the paragraph "Justifying their Existence" might well be printed on cards, and hung up in every room in which directors and electricity committees meet, and form the basis of future policy.

May I suggest that a tenth point might be usefully added? It is "that every already connected consumer's premises should be reviewed with the object of ascertaining whether electricity is in use for every possible purpose." There can be little doubt that it would be possible to secure from the majority of existing connections at least double the present revenue. Many domestic consumers use current for lighting only, others possibly have an odd radiator or two, an iron, a vacuum cleaner, and so on, but until electric cooking is in use in every home the competition of other forms of heating and cooking will remain a force to be reckoned with. The cooking and water-heating business must be got, and the form of two-rate tariff adjusted to make this both practicable and profitable. In by far the greater part of the country this can now be done; in a few areas such business is being actively pursued, but in others with half-hearted enthusiasm.

Chesham, Bucks, *July 8th.* ARNOLD B. GRIDLEY.

**Members of the Electrical Contractors' Association and friends at Tor Abbey, Torquay.** **(See page 39)**

### The I.E.E. Council Election

I am directed by the President to refer to a circular which was recently sent to a number of members of the Institution in favour of the nomination of a member of the Institution for election to the Council.

The use of the Institution's address at the head of the circular is unauthorised, and may tend to give the impression, contrary to the fact, that the Council has given its support or approval to the circular. There appears at the foot of the circular the signature of a person who is not a member of, or known to, the Institution, and this signature is followed by the word "Secretary"; this, in combination with the address from which the circular is written, is apt to give the impression that the signatory is secretary of the Institution, which is not the fact. PERCY FITZ-PATRICK ROWELL,

*Secretary*, Institution of Electrical Engineers.

London, W.C.2, *July 7th.*

[We have received other communications on this subject, but we feel that with the publication of the above letter from Mr. Rowell, the Secretary of the Institution, we can leave the matter.—EDS., ELEC. REV.]

### Problems for the Contractor

To disparage the work of the contractor has become quite a habit, and the mischief created is doubtless intentionally harmful to a well-meaning body of men. Attention to the great part they play is deflected by reference to the requirements of the supply authorities. Does it mean that when these authorities go into trade they can ignore the prevailing conditions, and conduct the business at a loss because it is ratepayers' money they are playing with?

The contractors' activities are met with systematic obstruction and oftentimes a flat refusal to supply a public service, and those responsible for this are perambulating the country giving lip service to ideals. There should be no reason for hostility, and, furthermore, if the associations concerned were not so wrapped up in useless conventions, dinner parties and other revels, much cant and humbug would be avoided.

Is this destructive and remorseless force hanging over the contracting industry to be fought with indulgence and indifference? L. E. WILSON.

Manchester, *July 10th.*

### Hire Charges for Domestic Apparatus

In his presidential address to the E.C.A. at Torquay last week Mr. W. B. Williams took exception to supply authorities hiring apparatus, at a loss, if necessary, in order to gain a profit from the sale of electricity. I maintain that supply authorities are justified in doing so. I am convinced that no supply authority can hope successfully to develop a cooking load unless it is prepared to hire out cookers at rentals which are competitive with gas cookers in its area.

I know of a supply authority in a good residential district whose rates for domestic purposes are, I believe, lower than any other in this country, and it is quite unable to build up a cooking load because it attempts to recover by way of rental the economic annual charges on the cooker installations. The psychology of human nature is such that consumers will not pay much more for the rental of an electric cooker than they will pay for a gas cooker, although it may be pointed out to them that the cost of energy plus rental for an electric cooker will be less than for the hire charge and gas consumed on a gas cooker.

Can Mr. Williams inform me of any supply authority which has developed a successful cooking load where remunerative charges are made for hiring? I am satisfied that in my own area the average cost of electricity to all consumers is much lower to-day than it would have been if remunerative charges for the hiring of cookers had been adopted. I have so far dealt with cookers only. I maintain, however, that there are many other domestic appliances which supply authorities must let out on hire at unremunerative rentals in order to compete successfully with their rival gas and develop the sales of electricity, which is their chief business.

In conclusion, I would express the opinion that contractors cannot possibly give the service that is essential to the successful hiring of domestic appliances in the same way that supply authorities do. A. E. MCKENZIE,

Wimbledon, S.W.19, *July 8th.* *Chief Engineer and Manager*, Corporation Electricity Dept.

### Rent Restriction and the Electrical Industry

The Rent Restrictions Amendment Bill, which has now passed through the House of Commons, is of no small import to domestic electrical contractors. The original Rent Restrictions Bill, which was passed many years ago during a period of acute housing shortage, prevented landlords from raising the rents of certain types of houses. Now that there is no serious shortage of these houses we have the anomaly of pre-war tenants paying only a half, or even a quarter, of the rent paid by their neighbours occupying exactly similar premises. Under the present Bill, many hundreds of thousands of these houses throughout the country will become decontrolled on September

29th, and a long-standing obstacle to electrical development will be removed.

If a census could be taken it would probably show that more than 95 per cent. of the houses occupied by pre-war tenants are lighted by gas. A significant and undisputed fact, however, is that those houses which have become decontrolled through vacancy (and thereafter let at higher rentals) are being rapidly converted to electricity. It is obvious that the landlord of a "controlled" house who is receiving an uneconomic rent cannot afford the expense of wiring it for electricity. If, on the other hand, the house becomes decontrolled and he is able to raise the rent to a more economic level he will naturally feel more inclined to replace the obsolete lighting system by electricity. The additional expenditure entailed in so modernising the house will be amply justified by the increased rent that he will receive. Bearing these facts in mind, we may reasonably anticipate something in the nature of a boom next winter in the domestic wiring trade.

R. G. KEATS.

Wimbledon, S.W.19, *July 5th.*

### What is a Consultant?

I have read with interest the letter in your issue of June 30th signed by "Manufacturers' Engineer." I think he is right in saying that the manufacturer's prospects of securing an order are obviously enhanced if he prepares the specification, but is not that alone a sufficient condemnation of the practice?

The writer of the letter assumes that consulting engineers do not keep in touch with the latest developments of the manufacturers. Does not this point to some remissness on the part of firms in not bringing their productions before the notice of consulting engineers? The real trouble is, I think, that in some cases travellers or representatives of manufacturing firms do not trouble to call on consulting engineers and leave copies of their lists, &c., because consulting engineers do not place orders then and there for the apparatus in question. All they can do if they are impressed by the apparatus is to include it with others in their next specification, and then select from the alternatives offered the one which in their judgment best meets their clients' requirements.

The suggestion that consulting engineers should keep in close touch with manufacturers, and only include in their specifications what they consider is the latest and most efficient apparatus for the purpose, is obviously impracticable. They should so draw their specifications that tenderers can include any apparatus which complies with the requirements as set out therein, and if alternative offers are put forward they will then select that which they consider is the best from their clients' point of view.

A. H. DYKES,
*Joint Hon. Secretary,*
Association of Consulting Engineers.

London, S.W.1, *July 5th.*

### Experience Tells

Some time ago we toilers on the upward slope for promotion were taunted by the quip "poor salesmanship." For ten years only nippy lads between twenty-five and thirty-five have been appointed to new jobs; now "Grid Bias" notes "rot" in the salesmanship line and asks if there are not the right men and women about. They certainly are, but some have reached that terrible age of forty.

First we had that blessed word "rationalisation" to get rid of the diehards, then "salesmanship" to keep them out; in the near future we shall hear the whisper of the winter's wind "lack of executive power." After that the cycle will be completed with "experience tells." But it will be too late for some!

TWENTY YEARS A WORKER.

## Special Oscillograph Equipment

THE following notes relate to a few representative selections of special oscillographs recently supplied by the Cambridge Instrument Co., Ltd.

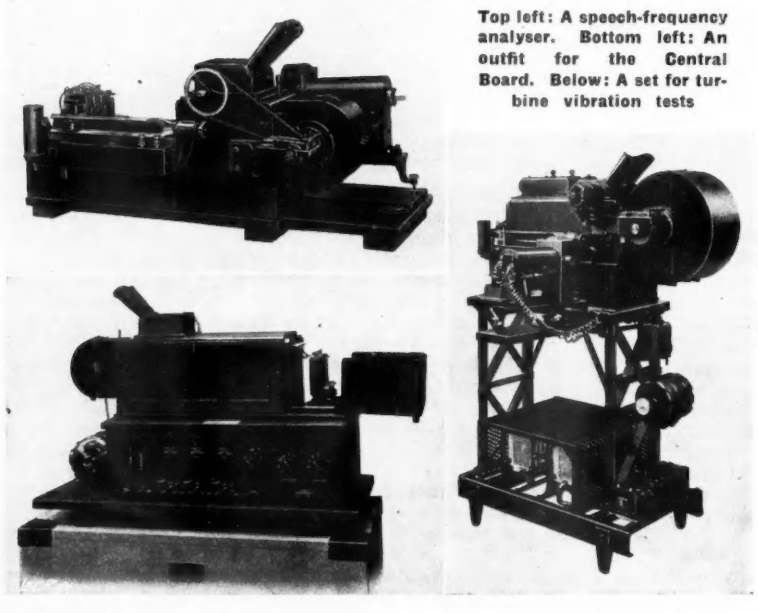
One supplied to the Post Office Research Station was primarily constructed for automatic telephony research work. It consists of a standard low-frequency outfit, with the addition of transient contacts, and a tubular metal stand which also carries a switchboard with adjusting resistances for the vibrators, the necessary fuses, vibrator reversing switches, and a resistance for the lamp. The driving motor and resistance are mounted on the side of the outfit. Time markings are made by a 50-cycle tuning fork recording intervals of 0.01 second.

For the Central Electricity Board an outfit was designed for measurements up to 230 V from 0.5 to 5 A, and when used with potential and current transformers for higher values. To render the outfit suitable for easy transport the vibrator units are rigidly fitted to a base. A series resistance for 230 V and a set of shunts are mounted in a ventilated compartment, in which also is fitted the vibrator adjusting resistances, reversing switches, fuses and lamp resistances. Space is also provided for an additional camera, and the complete outfit is contained in a strong wood carrying case.

A third equipment was specially constructed for the Research Department of the British Broadcasting Corporation for work in connection with the analysis of speech frequencies. A drum camera and a continuous film camera are easily interchangeable, while time marking is effected by a tuning fork giving 0.01 second intervals.

An outfit designed for recording wireless echoes, *i.e.*, the time between reception of a ground impulse and a simultaneous impulse after reflection from the upper atmosphere, is that supplied to the Radio Research Station, Slough. One vibrator records the short duration radio-frequency pulses, and another is connected to a standard frequency source for timing. The outfit is supplied with an automatic arc lamp in addition to a low-voltage filament lamp. The motor and the electromagnet are operated from a low-voltage supply.

In the laboratory of Messrs. Fraser & Chalmers Engineering Works a special equipment is used for vibration tests on turbine wheels and blades. It consists of a standard three-element, high-frequency outfit fitted with a drum camera carrying film 12 cm. wide by 1 m. long, which, together with a motor for driving the camera drum, a tuning fork giving 1/100th second time marking, the necessary regulating resistances and accessories, are all mounted on a suitable metal stand. An additional camera taking film 6.3 cm. wide is also supplied for continuous recording.



**Top left: A speech-frequency analyser. Bottom left: An outfit for the Central Board. Below: A set for turbine vibration tests**

An equipment supplied to the Sunderland Technical College is designed for use on pressures up to 50 kV, and is similar to standard equipment except that a "Pointolite" lamp is used instead of an incandescent lamp, thus enabling well-defined visual observations to be made over long periods.

### The I.E.E. Journal

The Institution of Electrical Engineers has just published a ten-year index to its *Journal* covering volumes 60 to 69 (1922-31). The price is 10s. 6d. net.

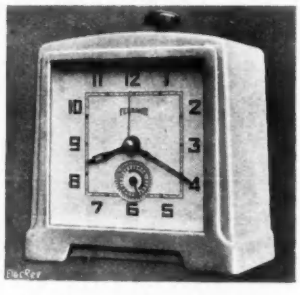
# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

### A Synchronous Alarm Clock

A synchronous electric alarm clock, priced at 25s., made its début at the exhibition held by MESSRS. FERRANTI, LTD., Hollinwood, at Bush House, London, recently.

The alarm is of the buzzer type, and does not, therefore, give a discordant ring; it is fully automatic, and when quietened in the morning does not require to be reset for the next day, as it is designed on the twenty-four-hour basis. The alarm is stopped by depressing a knob at the top of the clock, and when it is necessary to stop the alarm for several days it is only necessary to press the knob and give it half a turn.



The new Ferranti alarm clock

The clock is housed in a "Bakelite" case, which is obtainable in red, mahogany, walnut, or blue enamel.

### New Revo Fires

Two new fires introduced by the REVO ELECTRIC CO., LTD., Tipton, Staffs, are called the "Revocole" and the "Revolog." They are identical but for the imitation fuel, and have measurements of 23 in. high by 15¼ in. long by 10 in. deep. The loading is 2,000 W, plus 60 W for the lamp which gives the flicker effect.

The "Revolog" fire

The frame, which is of fine grain cast iron, is encased by hammered sheet metal sides, while the back is easily removable to facilitate access to the lamp and firebars. The "fuel" in both cases is of cast iron on strong "Arctic" ripple glass through which the glow filters.

The two firebars of 1,000 W each are controlled by separate switches, both of which are independent of the lamp which produces the fire effect. The price is £3 10s. in oxidised silver or copper, and £4 12s. 6d. in Florentine bronze. The weight is 28 lb.

### Light for Health

According to our state of health, we are deficient in a certain colour, says MR. DEIGHTON-PATMORE, 38, Clarges Street, Piccadilly, W.1, who, in introducing a series of "Vessels of Light," has aimed in each case at supplying the correct colour required for absorption by the "patient."

The globes referred to afford what is generally known as totally enclosed lighting, and are very artistic in design. The glass used has been treated to produce correctly coloured light of high intensity.

A "Vessel of Light"

### Variable-mu Mains Valves

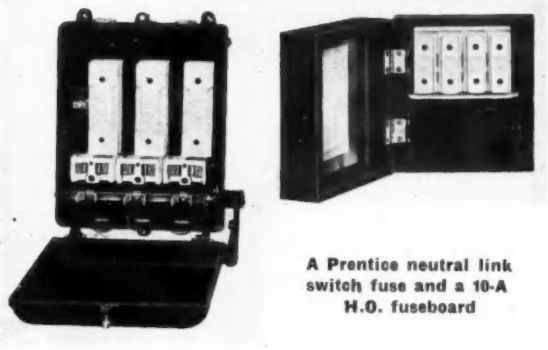
With the introduction of two new high efficiency variable-mu mains valves, the range of the MARCONIPHONE CO., LTD., 210, Tottenham Court Road, W.1, now incorporates four types covering all requirements. Types VMS4 ("Catkin" or glass) and VDS have maximum slopes of the order of 2.5 mA per V, and a 30-V grid base, which is suitable for use in practically all existing commercial receivers with variable-mu valves.

The VMS4B and VDSB types now announced have a maximum slope around 3.0 mA per V, and a 15-20-V grid base. These valves are suitable for use in a.v.c. circuits, where the shorter grid base provides a more complete control of gain over a smaller range of grid bias. In the popular four-valve super-het circuit they provide a means of obtaining increased i.f. amplification in many of the receivers now on the market.

### Neutral Type Switchgear and Fuseboards

A new range of neutral type switchgear and fuseboards has been brought to our notice by MESSRS. PRENTICE, LTD., Low Hall Mills, Holbeck, Leeds.

Neutral link switch fuses are available from 20 to 120 A, 500 V, and from 10 to 30 A, 250 V, and there are three types for each size—a single-pole switch, single-pole H.O. fuse units and neutral; the same with a double-pole switch; and one with a triple-pole switch, triple-pole fuses and neutral. A range of neutral links for 250 and 500 V has also been introduced, one type being arranged with metal slotted holes; all models are available with a single- or double-pole switch.

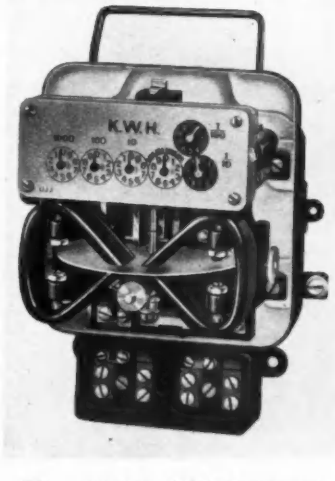


A Prentice neutral link switch fuse and a 10-A H.O. fuseboard

Another innovation is a number of new fuseboards of various types, all complying with H.O. recommendations with single pole and neutral bar. Rated at 250 V, there are 10-, 15-, 20- and 30-A models, with 2, 3, 4, 5, 6, 8, 10 or 12 ways, and each model can be obtained in an iron or teak case, the latter type being available with a glass or wood front. Similar fuseboards can be obtained for 500 V, 20, 30, 40, 60 or 120 A.

### A New House Service Meter

Unique distribution of the magnetic fields, resulting in extremely small vibration of the disc; easy accessibility of the essential parts; ready adjustment without the use of tools; robustness and durability, are the outstanding features of the new type "Z" single-phase, house-service, a.c. induction-motor watt-hour meter introduced by MEASUREMENT, LTD., Terminal House, Lower Belgrave Street, London, S.W.1. It is made in 2½-, 5-, 10-, and 20-A sizes for standard voltages.




The new type "Z" house service meter of Measurement, Ltd.

The pressed-steel base is enamelled black outside, and white inside to facilitate inspection of the gaps, and the pressed-metal cover is secured to the base by permanently attached screws and external lugs.

The complete meter element unit, with its cast-iron frame, is secured to the meter base by four screws, and its withdrawal for inspection does not effect the calibration in any way. The rotor weighs 18 grammes, and can be easily removed. The disc is of aluminium and the driving spindle of duralumin, with the worm cut into the shaft, so reducing friction to a minimum. The top bearing is a flexible steel pin projecting from its mount into the cap and chamber of the rotor shaft,

and the bottom bearing is a sapphire jewel mounted on a spring contained in a jewel barrel covered by the screw cap.

The meter will start and run on 0.5 per cent. of its rated full-load current, and on an over voltage of 10 per cent. the meter will not run on shunt at full load. The rotor speed is 20 r.p.m., while the torque at full load is about 4 gm.-cm. Series loss at full load for a 5-A meter is 0.25 W, and the shunt loss is 1 W at 230 V.

## A Prepayment Meter Lock

The Castell seal pinlock, introduced by MR. J. H. CASTELL, 42, Tavistock Street, W.C.1, is designed to afford safe but simple locking on prepayment meters. It also renders the money draw free from "shake." It is of small dimensions and robust construction, and is made of brass throughout.

A prepayment meter with a "Castell" seal pinlock for the money draw

The seals, which are supplied in rolls, all bear different numbers, and they can be supplied in various colours. The key can only be withdrawn from the locked position.

## A New Kettle

A 4-pint kettle is now being marketed by the ARORA CO., Loughborough, at 22s. 6d. It is fitted with a 1,000-W element and has a body of nickel-plated copper.

The new Arora kettle

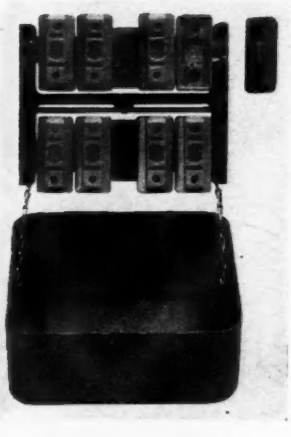
## A Red-hot Boiling Plate

The special non-cast material in which the elements are embedded enables a sufficiently high load density in the new plate introduced by SIMPLEX ELECTRIC CO., LTD., 159, Gt. Charles Street, Birmingham, to afford red-hot operation. It also eliminates distortion troubles.

The plate diameter is 8 in., and the maximum loading 2,000 W. The element is arranged in two sections, so as to give, in effect, two plates, an inner one loaded at 800 W and an outer one at 1,200 W. Control is by an ordinary three-heat switch, the normal arrangement being to have only the inner plate on for medium heat.

## Pressed-steel Fuseboards

Exceptionally light weight is the principle feature of the new range of "Stelac" pressed-steel fuseboards introduced by MESSRS. J. H. TUCKER & CO., LTD., King's Road, Tyseley, Birmingham. They are about one-third the weight of equivalent equipment in cast iron.



A four-way "Stelac" fuseboard

In appearance they are particularly "clean," the one-piece cover presenting simple flat surfaces, enamelled dark brown, with well-rounded corners and no projecting lugs. A single captive fixing nut securely locks the cover in the closed position, and when "open" it is automatically suspended by a pair of chains.

Easily removable "knockouts" are provided to accommodate surface wiring entries. A cadmium-plated pressed-steel frame carries rust-proofed steel battens to which the fuses are secured, and has fixing holes at standard brick centres. Simple slots at the fixing points provide for easy and quick removal of the battens, and one of the screws carries a cupped washer for an earthing connection.

The plug-in fuses have the fuse wire inserted beneath the clamping plate at the base of each pin, which is tightened up by finger-grip grooves longitudinally along the pin surface; a slot at the end of the pin allows for further tightening by a coin if required.

Three case sizes, the largest of which is 6½ in. by 8$\frac{3}{16}$ in. by 2¾ in., provide for 2-, 3-, 4-, 5-, and 6-way d.p. boards. The three-way model is listed at 8s. 8d.

## Illuminated Moving-scale Indicator

For use with all electrical indicating instruments employing a galvanometer-type movement, the CAMBRIDGE INSTRUMENT CO., LTD., 45, Grosvenor Place, S.W.1, has developed a moving-scale indicator.

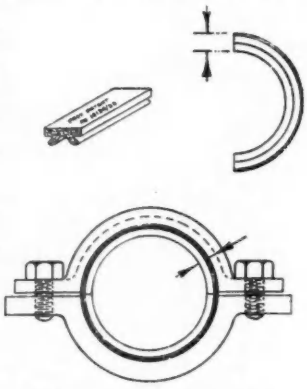
A radiation pyrometer indicator unit equipped with an illuminated moving scale

A scale engraved on transparent material is mounted on the moving coil, and a magnified image of a small portion of it is optically projected on to a translucent screen carrying a fixed pointer. The greatly enlarged scale thus obtained is very clear and easily readable from a considerable distance.

Portions of the scale may be stained different colours to indicate, for example, when the temperature rises or falls beyond certain desired limits. Because a well-defined scale is given under all ordinary lighting conditions the use of the instrument is not restricted to badly lighted positions.

## Lead Strip Packing

MESSRS. SYKES & DYSON, LTD., Queen's Mill Road, Huddersfield, have introduced "Elixum" lead strip packing for use with joint boxes. It can be supplied in 6-ft. lengths, to cut off in short pieces the exact length required to suit any cable diameter, or bore of cable boxes, as shown in the accompanying illustration.



"Elixum" collapsible lead strip

The inside of the lead strip makes a contact with the cable, while the radiused feet collapse under the clamping pressure, thus forming a perfect bond between the cable and box, which adjusts itself to any variation in cable diameter or irregularity of holes in the cast boxes. It is also useful for adapting a standard service box to suit a smaller cable. Stretching, irregular wrapping and creasing of the lead tape are avoided, and a considerable saving of time is effected.

## A Novel Vacuum Cleaner

The novel feature of the "Supreme" electric cleaner recently introduced by MESSRS. L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, W.C.2, lies in the fact that the motor and container unit are at the extreme operating or handle end; in fact, a short vertical single-grip handle is directly bracketed to the casing.

By replacing the long tube connecting the usual nozzle with a special short nozzle the machine is converted into an efficient single-hand stair cleaner.

The casing, tube and fittings are totally enclosed, and the price is £5 19s. 6d. in chromium. The same model is available in nickel and scarlet finishes at £4 19s. 6d.

The "Supreme" electric cleaner

# New Books

**The Working Principles of Motor Vehicle Lighting and Starting.** By W. C. STODDART. Pp. 512; figs. 250. London: "Automobile Electricity." Price 15s.

This book is divided into thirty-three chapters in which the author deals in simple language with every detail of his subject, beginning with fundamental principles. Indeed, although there is perhaps a little irregularity in their order there seems hardly a subject within the scope of the book that is not dealt with. Two points which may be specially commended are the large number—over 250—of specially prepared sketches and diagrams to elucidate the text and the elaborate series of fault-finding charts diagnosing both mechanical and electrical causes of failure which should be particularly useful to the garage electric man. The book concludes with a glossary of electrical terms and symbols and an exhaustive index. It is unfortunate that the equally important section of automobile electrical installations—that of ignition—is not touched upon, but perhaps Mr. Stoddart has in mind the issue at a later date of a special work on this subject. In the section dealing with batteries, only the lead-acid type is dealt with, there being no reference to the nickel-steel accumulator. Another feature too, that may prove irksome to students of the work is that for complete descriptions of certain apparatus they are somewhat frequently referred to back numbers of the journal with which the author is connected. Finally, despite the extensive character of the index to which we have alluded, it has no direct references to accumulators, nor to the electrical installations on commercial and passenger-carrying vehicles.

---

**Photo-electric Applications.** By R. C. WALKER and T. M. C. LANCE. Pp. 193; figs. 111. London: Sir Isaac Pitman & Sons. Price 8s. 6d.

The authors give in an introductory chapter a really simple but up-to-date account of the theory and construction of photo cells, including the most recent types. Counting and timing gear, alarms, indicators, safety devices and advertising signs are then dealt with. In the latter, not only is the use of the cell stressed for operating illuminating apparatus at the most productive times, but such possibilities as the illumination of roadside advertisements by the lights of approaching motor cars are discussed. The cell, in fact, offers such immense scope for window and other advertisement signs that a new mentality is becoming necessary for inventors.

In the chapter on talking films a remarkable amount of useful information has been squeezed into a very small space, and we are glad to see that the important application of sound recording to sub-standard (16 mm.) film has been dealt with. It is not clear why, in dealing with apparatus for photo-telegraphy, the Bartlane system comes in for review, for it is the only one in which a photo-electric cell plays no part.

Television receives brief treatment in Chapter VIII, and the application of the cell to quite a number of scientific measuring instruments are described in a later chapter. The latter information was badly needed, and it alone makes the book a necessity for physical workers.

---

**Industrial Electric Heating.** By N. R. STANSEL. Pp. 444. London: Chapman & Hall. Price 31s.

This book is well printed, amply illustrated, and presents a great deal of useful information. It consists of articles originally appearing in the *General Electric Review*, amplified by much rather fortuitous general data. The final impression is one of rich lodes of practical matter, in part overlaid with less valuable agglomerate.

Details of design are taken exclusively from American practice, and the book by no means embraces the field suggested by its title. The author hints in his preface that such marked omissions as low-temperature heat applications, induction heating of solids, and production of ferro-alloys may form the subjects of future work. With these limitations the book has much to commend it and should certainly not be overlooked by the furnace designer and the student.

The first five chapters deal with fundamental principles, and later chapters deal with various forms of furnaces. In the chapter on arc furnaces one misses figures regarding operating costs for melting special alloy irons in tilting furnaces, to compare with those given for the rocking type. A list of references makes no mention of "Electric Heating," by Edgar A. Wilcox (1928), a book which serves as an excellent introduction to the important subject under review.

---

**Modern Electric Clocks.** By STUART PHILPOTT. Pp. 215; figs. 153. London: Sir Isaac Pitman & Sons. Price 7s. 6d.

Electric clocks and their latest developments form a topic of wide interest just now, and consequently one is more than usually attracted by the appearance of a new book on the subject. It is a well written and illustrated little work, dealing with all types of electrical timekeepers, and it attempts to cover the whole field of electrical horology in as comprehensive a manner as its size will allow.

Commencing with a brief exposition of electrical principles, it continues by dealing shortly with the pre-electric forms of clock and then describes the impulse types operated from a master clock. We are pleased to find that this section includes a description of the Synchronome-Shortt free pendulum observatory clock which has established a record for Britain in the field of timekeeping. The next part dealing with self-contained battery clocks is noticeably brief, while the following chapter covers the now popular synchronous mains-driven clocks. Many of the best-known makes are dealt with in this section, which concludes with a description of the master frequency control clocks for power stations. Subsequent pages contain descriptions of turret clocks, synchronised and similar clocks, electrically wound clocks and those used for ship installations, while the miscellaneous uses to which the various electrical clock systems have been put are not forgotten.

We noticed some errors and omissions in various places. For instance, a number of well-known types of electrical tower clocks, time recorders and impulse clocks are altogether ignored. Their inclusion would have been worth while, even if some of the description of electrical laws and principles had been curtailed to give the necessary room.

One error which appears in the final chapter must not pass unchallenged. In the description of the Garrard electric chiming clock, the motor is said to be self-starting. Actually, this is not the case, for the motor is of the normal slow-speed type, and has the usual starting lever—a fact which is mentioned later in the book by the author himself! The index is most complete, and the volume should be very useful to those interested in electric clock mechanism. Incidentally, the book shows how extremely rapid is the advance of electrical horology, for although it is only just published, a number of developments have taken place since it went to press. A particularly good feature is the clearness of both the line and half-tone illustrations, the details of which can be followed with ease.

---

**Kelly's Directory of the Merchants, Manufacturers, and Shippers of the World (1933).** Two vols. Pp. 2065 and 2169. London: Kelly's Directories. Price £3 4s.

This well-known publication brings into direct relation buyers and sellers in all countries, and no effort is spared to ensure the inclusion in the directory of the name of every firm which should be mentioned. The arrangement makes reference very simple, and there are complete indexes, so that, by consulting them once only, the user can find without difficulty the names and addresses of firms throughout the world which are engaged in the trade in which he is interested. All trade headings are given in English and French, and, wherever necessary, in the language of the country to which the information refers. Complete vocabularies in French, German, and Spanish, showing the translation in these languages of the English trade headings employed, are also provided. Volume I embraces all the countries of the world, except Great Britain, Ireland, and the British Dominions, Colonies, and Possessions, which are included in Volume II. These two volumes, as annually in the past, have been thoroughly revised.

* * *

## Shorter Notices

The League of Nations International Labour Office has issued in book form at 4s. its studies and reports on "Safety in the Manufacture of Celluloid." The first part deals with the elimination of the risks entailed in the manufacturing processes, and the second with safety regulations in various countries. The London publishers are Messrs. P. S. King and Son.

In our issue of March 17th (p. 377) we published an article based on the report of the Severn Barrage Committee. We have now received from H.M. Stationery Office a copy of "The Construction and Operation of a Tidal Model of the Severn Estuary"—two reports by Professor A. H. Gibson, with numerous diagrams on separate folding sheets (£2 2s.).

This year's "Blue Book," Electrical Trades Directory (Ernest Benn, 25s.) contains all the regular features. The Handbook Section has undergone changes and the various tables have been submitted to selected authorities by whom they have been brought up to date. The Financial Section, instituted in 1932, has also been extended to include a much larger number of companies and organisations.

"An Outline of Atomic Physics." Pp. 348. London: Chapman & Hall. Price 21s. 6d. The authors seem to have been successful in steering a middle course between mathematical phraseology and word pictures. In the general reader this book should awaken a respect for the achievements of physics in shedding new light on old problems. The fact that many of the more difficult parts can be passed over without breaking the continuity of the physical argument will appeal specially to the "arm-chair" reader.

From the Société Française des Electriciens, we have received a reprint of the speeches made at the recent banquet in Paris given in honour of M. Paul Boucherot, Professor of the Ecole Superieure d'Electricité, on which occasion he was presented with the Mascart Medal for 1933. The booklet also includes a reprint of the address made by M. Boucherot in acknowledging the honour conferred upon him in the course of which he gave an interesting account of his scientific career.

"Switchgear Stages." By H. W. Clothier. Newcastle-on-Tyne: G. F. Laybourne & Co. Price £1 5s.

"Electrical Transformer Theory." By S. Gordon Monk. London: Sir Isaac Pitman & Sons. Price 5s.

"Elements of Engineering Acoustics." By L. E. C. Hughes. London: Ernest Benn. Price 8s. 6d.

"Ray Controlled Mechanism." By Major Raymond Phillips. London: Percival Marshall & Co. Price 2s. 6d.

# Canadian Electrical Trade

STATISTICS of Canada's foreign trade during the year ended March 31st, 1933, have recently been issued by the Dominion Government. Details regarding the electrical trade are set out below, with notes of increases or decreases, as compared with the previous twelve months. On the import side decreases are shown under every heading except lamps.

Great Britain's share shows a smaller proportional decline than that of the United States, but is still very small in relation thereto. Exports advanced slightly (notably to Great Britain), but were less than a quarter the value of imports. Great Britain maintained her position in the import trade in transformers.

## Imports

| | 1932-1933. $ | Inc. or dec. as compared with 1931-1932. $ |
|---|---|---|
| *Primary batteries and parts—* | | |
| Total | 105,000 | – 41,000 |
| From United Kingdom | 1,600 | — |
| „ United States | 102,000 | – 40,000 |
| *Storage batteries and parts—* | | |
| Total | 169,000 | – 223,000 |
| From United Kingdom | 92,000 | – 92,000 |
| „ United States | 77,000 | – 131,000 |
| *Heating and cooking apparatus—* | | |
| Total | 178,000 | – 129,000 |
| From United Kingdom | 1,300 | – 200 |
| „ United States | 174,000 | – 125,000 |
| *Dynamos and generators—* | | |
| Total | 187,000 | – 259,000 |
| From United Kingdom | 24,000 | – 93,500 |
| „ United States | 159,000 | – 134,000 |
| *Electric fans—* | | |
| Total | 17,000 | – 40,000 |
| From United Kingdom | 200 | – 2,300 |
| *Fuses, plugs and cut-outs—* | | |
| Total | 40,000 | – 47,000 |
| From United Kingdom | 100 | + 30 |
| „ United States | 39,700 | – 46,300 |
| *Metal filament lamps—* | | |
| Total | 64,000 | + 19,000 |
| From United Kingdom | 1,000 | – 1,000 |
| „ United States | 33,000 | + 17,500 |
| *Torches, flashlights, head, side and tail lights—* | | |
| Total | 206,000 | – 119,000 |
| From United Kingdom | 2,100 | – 1,000 |
| „ United States | 183,000 | – 122,000 |
| *Lighting fittings and appliances—* | | |
| Total | 188,000 | – 509,000 |
| From United Kingdom | 10,000 | – 4,000 |
| „ United States | 160,000 | – 482,000 |
| *Lightning arresters, choke coils, &c.—* | | |
| Total | 17,000 | – 51,000 |
| From United Kingdom | 50 | – 550 |
| „ United States | 16,000 | – 51,000 |
| *Meters—* | | |
| Total | 84,000 | – 100,000 |
| From United Kingdom | 23,000 | – 18,000 |
| „ United States | 60,000 | – 79,000 |
| *Motors—* | | |
| Total | 878,000 | – 882,000 |
| From United Kingdom | 169,000 | – 136,000 |
| „ United States | 684,000 | – 730,000 |
| *Rheostats, controllers, &c.—* | | |
| Total | 193,000 | – 95,000 |
| From United Kingdom | 26,000 | — |
| „ United States | 166,000 | – 94,000 |
| *Self-contained lighting outfits—* | | |
| Total | 500 | – 13,100 |
| From United Kingdom | — | – 300 |
| „ United States | 500 | – 12,500 |
| *Sockets, outlets and receptacles—* | | |
| Total | 49,000 | – 125,000 |
| From United Kingdom | 500 | – 4,500 |
| „ United States | 48,000 | – 120,000 |
| *Sparking plugs, magnetos, &c.—* | | |
| Total | 260,000 | + 20,000 |
| From United Kingdom | 48,000 | + 27,000 |
| „ United States | 209,000 | – 1,000 |
| *Steam turbo-generator sets, 700 h.p. and over, of a class or kind not made in Canada (from June 1st, 1931)—* | | |
| Total | 21,000 | – 210,000 |
| From United Kingdom | 5,000 | – 114,000 |
| „ United States | 14,000 | – 31,000 |
| „ Switzerland | 1,500 | – 66,500 |
| *Switches, switchboards and circuit breakers—* | | |
| Total | 401,000 | – 492,000 |
| From United Kingdom | 26,000 | – 46,000 |
| „ United States | 367,000 | – 448,000 |
| *Telegraph apparatus—* | | |
| Total | 28,000 | – 277,000 |
| From United Kingdom | 4,700 | – 23,300 |
| „ United States | 23,000 | – 254,000 |
| *Telephone apparatus—* | | |
| Total | 368,000 | – 744,000 |
| From United Kingdom | 49,000 | – 211,000 |
| „ United States | 316,000 | – 535,000 |
| *Transformers—* | | |
| Total | 294,000 | – 189,000 |
| From United Kingdom | 243,000 | – 76,000 |
| „ United States | 51,000 | – 112,000 |
| *Radio valves—* | | |
| Total | 61,000 | – 32,000 |
| From United Kingdom | 5,000 | – 5,000 |
| „ United States | 56,000 | – 27,000 |
| *Radio apparatus—* | | |
| Total | 1,043,000 | – 3,024,000 |
| From United Kingdom | 36,000 | + 4,000 |
| „ United States | 1,005,000 | – 2,999,000 |
| *Unenumerated electrical apparatus—* | | |
| Total | 1,139,000 | – 1,023,000 |
| From United Kingdom | 85,000 | – 2,000 |
| „ United States | 1,021,000 | – 987,000 |
| *Total electrical apparatus, lamps and fixtures—* | | |
| Total | 6,049,000 | – 8,623,000 |
| From United Kingdom | 854,000 | – 799,000 |
| „ United States | 5,029,000 | – 7,618,000 |

## Exports

| | 1932-1933. $ | Inc. or dec. as compared with 1931-1932. $ |
|---|---|---|
| *Accumulators—* | | |
| Total | 122,000 | – 7,000 |
| To New Zealand | 37,000 | – 22,000 |
| „ Argentina | 30,000 | + 13,000 |
| *Other storage batteries—* | | |
| Total | 63,000 | + 26,000 |
| To United Kingdom | 22,000 | + 21,300 |
| „ New Zealand | 34,000 | + 1,000 |
| *Telegraph, telephone and radio apparatus—* | | |
| Total | 221,000 | + 34,000 |
| To United Kingdom | 108,000 | + 55,500 |
| „ New Zealand | 36,000 | – 19,000 |
| „ Brazil | 30,000 | + 4,000 |
| „ United States | 19,000 | + 2,000 |
| *Dynamos, generators and motors—* | | |
| Total | 46,000 | + 32,000 |
| To United Kingdom | 32,000 | + 29,000 |
| „ Newfoundland | 8,100 | + 6,500 |
| *Domestic cooking and heating devices—* | | |
| Total | 395,000 | – 110,000 |
| To United Kingdom | 43,000 | + 26,000 |
| „ British S. Africa | 274,000 | – 81,000 |
| „ New Zealand | 31,000 | – 22,700 |
| „ China | 12,000 | – 15,000 |
| *Sparking plugs, magnetos and other ignition apparatus—* | | |
| Total | 342,000 | + 86,000 |
| To United Kingdom | 210,000 | + 52,000 |
| „ British S. Africa | 19,000 | – 8,000 |
| „ India | 27,000 | + 18,000 |
| „ Australia | 35,000 | + 18,000 |
| „ New Zealand | 17,300 | + 1,200 |
| *Unenumerated electrical apparatus—* | | |
| Total | 159,000 | – 11,000 |
| To United Kingdom | 41,000 | + 1,000 |
| „ New Zealand | 13,000 | – 7,000 |
| „ Brazil | 13,000 | + 10,600 |
| „ Japan | 6,200 | – 2,200 |
| „ Mexico | 46,000 | – 10,000 |
| *Total electrical apparatus—* | | |
| Total | 1,348,000 | + 51,000 |
| To United Kingdom | 456,000 | + 184,000 |
| „ United States | 35,000 | – 6,000 |

# The Rhodesian Electrical Market

WHILE a great deal is heard to-day of the large electrical goods market which is to be found in the Union of South Africa, the opportunities in the neighbouring colony of Southern Rhodesia come in for considerably less attention. Yet for a territory with a European population of only 50,000 these opportunities are exceptionally valuable, particularly from the point of view of British suppliers. The desire of local importers to deal as extensively as possible in goods originating in the "Old Country" is very strong.

There are six municipal electrical undertakings in Southern Rhodesia—at Salisbury, Bulawayo, Umtaali, Gwelo, Gatooma, and Fort Victoria. At Salisbury a new power station was brought into operation in January, 1931, and is now being extended. There are 1,920 lighting and domestic consumers in the town and 110 industrial power consumers. The municipality has instituted a deferred payment system for the purchase of domestic appliances.

The Bulawayo plant was taken over by the municipality from the Bulawayo Waterworks Co., Ltd., in 1924, and has since been greatly extended and improved. Consumers of electricity for lighting and heating purposes number 2,348 and for power 194. Gwelo started a municipal plant in 1915, and now has 327 consumers of light and thirty-three of power. At Umtali these totals equal 442 and eighteen respectively, at Gatooma 146 and six, and at Fort Victoria ninety and four. In addition, many of the larger gold mining concerns of the colony have large electrical installations.

Imports of electrical materials into Southern Rhodesia are mainly obtained from the United Kingdom. In 1932, for instance, electric cable and wire was imported to the value of £14,244, and of this sum the British share was £13,624. Imported electric lamps were valued at £8,866 (U.K. £6,160), batteries at £13,596 (U.K. £10,149), and other electrical material at £16,581 (U.K. £9,209).

The trade in electrical machinery included electric motors £6,323 (U.K. £5,446), transformers £3,864 (U.K. £3,255), and other electrical machinery £30,060 (U.K. £26,089). The value of wireless and telephone instruments and appliances imported totalled £15,888 (U.K. £7,838). All these figures represent decreases as compared with 1931, but it is to be anticipated that an upward tendency will be shown as soon as the general economic situation improves.

What little foreign competition there is comes largely from the United States. Holland, Sweden, Denmark, and Germany are, however, all competitors of minor importance.

At least 50 per cent. of the wireless goods business is in American hands, while a great number of the valves imported come from Holland. The U.S.A. claims a relatively small proportion of the machinery trade, but in 1932 supplied batteries to the value of nearly £2,000. The electric lamp market, while dominated by the United Kingdom, is also participated in to some extent by Germany, Holland, Hungary, Italy, Czechoslovakia and the U.S.A.

## The French Electrical Industry

The annual report of the French Syndicat Générale de la Construction Electrique, which was submitted at the general meeting on June 15th, states that all branches of electrical manufacturing experienced a material slackening in their activity in 1932. The value of exports declined from 278 million fr. in 1931 to 142 million in 1932, being a reduction of about 48 per cent. in tonnage and value, the exports to Great Britain showing a shrinkage of 43 per cent. Imports were materially influenced by the liquidation of the deliveries in kind, which had a value of 35 million fr. The total value of imports in 1932 was 422 million fr. as compared with 566 million fr. in 1931. Of this, radio apparatus accounted for one-third (147 million fr.). The reduction of electrical products, other than radio apparatus, in the case of deliveries from Great Britain was 42 per cent. The report states that no appreciable signs are yet perceptible of any improvement in the situation.

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## The " Electrical Review " Index

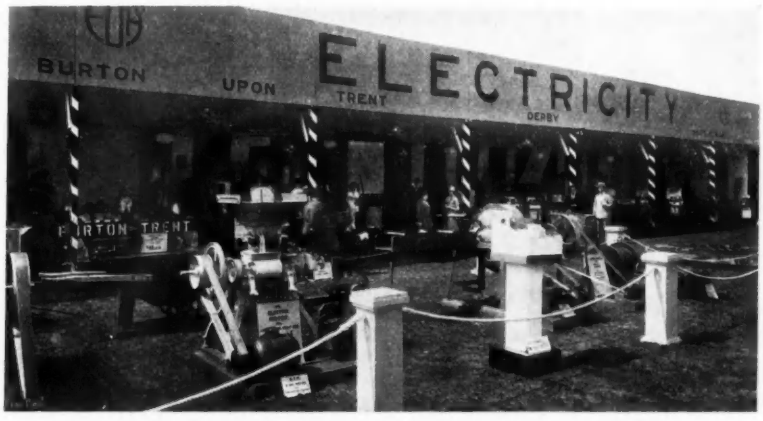
The Index to Vol. CXII (for the half-year ended June 30th, 1933) will be published shortly. Readers who require it (free of charge) for binding purposes, or wish to retain it for reference, should apply to the Publisher, Dorset House, Stamford Street, S.E.1.

## The Marking of Imported Electric Clocks

The Standing Committee appointed by the Board of Trade will hold an inquiry on July 31st and August 1st as to whether clocks (including electrically driven types), clock movements, synchronous electric motors for clocks or time-recording instruments, &c., shall be required to bear an indication of origin. The inquiry will be held at the Board of Trade Offices, Great George Street, S.W.1. Communications should be addressed to the Secretary, Mr. E. W. Reardon, at that address.

## The Advertising Convention

The ninth Advertising Convention will be opened by the Prime Minister on Tuesday morning next, July 18th, at Olympia. It will run concurrently with the Advertising and Marketing Exhibition which Lord Derby opens on the previous day. Both the convention and the exhibition will be events of first importance and it is expected that they will contribute substantially to the development of various industries. The exhibition will include an exceptionally effective demonstration of advertising ingenuity and originality. All who are in any way interested in the production of material used in the many forms of advertising that are available to-day will hardly miss the opportunity of visiting an exhibition of such great educative value. We are promised a business attraction far surpassing in comprehensiveness and appeal any event of a similar nature. Among the subjects to be dealt with at the different sessions throughout the week is poster advertising, a matter in which the electrical industry is particularly interested; direct mail, print and service; Empire markets; Home trade; and salesmanship. Mr. G. Russell Chapman is the general secretary and communications should be addressed to him at the Advertising Association, 110-111, Fleet Street, London, E.C.4.




**The combined electrical exhibit at the Royal Agricultural Show**

## The Timber Market

Our Timber Trade Correspondent states that the lifting of the embargo on Russian timber will stay the upward trend of prices prevailing for building woods during May and June. The hardwood market has also considerably stiffened since last month, mainly because of the growth of business in the United States, and the fact that dry supplies of oak, ash and other popular woods are short over there. These conditions are commencing to stimulate the demand here for mahogany, cedar and other hard and fancy woods from both Empire and foreign countries, but principally the former. There are large stocks of imported plywood on this market.

## The New Liverpool Stadium

The recently opened stadium in St. Paul's Square, Liverpool, provides a good example of modern technique in both interior and exterior lighting. For illuminating the boxing and other sporting exhibitions staged there, the General Electric Co., Ltd., has designed a special unit which is suspended immediately above the " ring." Within its circumference are incorporated twenty-five spun aluminium reflectors, each containing a 1,500-W lamp. The intensity of light thus produced may be realised from the fact that motion pictures of a fight in progress can be taken without any auxiliary lighting. For occasions when this main " ring " illumination is unnecessary, light is provided by ceiling fittings with white glass panels and by totally enclosed " Britalux " fittings. At each corner of the building a 200-W Wembley lantern assists to secure an even diffusion of illumination. At night time four 500-W G.E.C. floodlights installed immediately above the tilted canopy show to advantage the architectural features of the building, while the pavement beneath the canopy and vestibule entrance is illuminated by " Osram Striplite " lamps. The electrical contractors responsible for the installation, in collaboration with the Illuminating Engineering Department of the Liverpool branch of the G.E.C., were Messrs. John Hunter & Co., Liverpool.

## German Radio Valve Prices

As from July 1st the German retail prices of radio valves for small battery receivers were reduced by an average of 22 per cent. In the case of other valves the reduction is from 21 to 27 per cent. The prices of Philips valves are said to have been also lowered by about the same amounts. The reductions are assumed to be due to the expiration next year of the Lieben patent.

## Electrical Features of the Royal Agricultural Show

During recent years at the Royal Agricultural Show there have been several separate electrical stands in different parts of the showground organised by various interests. It was considered that this year an effort should be made to assemble all electrical exhibitors within one large group. The result at Derby was a continuous run of 250 ft. of shedding forming a combined electrical display, being occupied by the Derbyshire & Nottinghamshire and Leicestershire & Warwickshire Electric Power Companies, the British Electrical Development Association in conjunction with the Electricity Departments of Derby, Nottingham and Burton-upon-Trent, and by the General Electric Co., Ltd. The Derbyshire and Leicester companies' exhibits covered practically the whole of the very wide field of application of electricity to the farm and farmhouse, while immediately adjacent to their stand was the E.D.A. inquiry office, where information was given regarding the supply of electricity in any part of the country. Next to the E.D.A. inquiry office the city of Nottingham had a big display dealing mainly with the application of electricity to the farmhouse and the advantages to be obtained by the farmer's wife through the use of domestic appliances. Derby and Burton-upon-Trent also emphasised the importance of electricity to the country housewife.

On the open portion of the stand the E.D.A. had a comprehensive display showing the applications of electricity to general farming. The General Electric Co., Ltd., showed a representative collection of its equipment designed to assist the farmer.

## Barking Power Station

We regret that in our page of pictures last week we inadvertently attributed the Barking station to the London Power Co., thereby robbing the County of London Electric Supply Co., Ltd., of due credit for this important undertaking.

## Electrical Tableaux at Southampton

During the special carnival procession in connection with the Southampton Hospitals Carnival Week the Corporation Electricity Department entered two tableaux representing contrasts, and took first prize with one of them. The prize-

**An electrical tableau at Southampton Carnival**

winning entry represented two methods of cooking. One scene depicted cannibals dancing around an unfortunate missionary, crouching in a pot over a fire. "Don't cook this way!" was the slogan applied to this episode. The other scene (shown in the accompanying illustration) was a neat little chef—a curly haired girl—carrying out her culinary duties with the assistance of electricity. Beside her was a mammoth electric cooker and a gigantic electric kettle, the former being lent by Revo Electric Co., Ltd., and the latter by Messrs. Bulpitt & Sons. "So simple that a child can use it," ran the slogan. The second tableau entered by the Department contrasted the electric with the old-fashioned wash-day.

### Electricity Supply Rifle League

As a result of the June matches in the three divisions of the Electricity Supply Rifle League, the leaders are now as follows:—First division: City "A," ten points. Second division: L.P. Co., six points. Third division: K. & K., fourteen points.

### High-speed Portable Welding Plant

Referring to the note on this matter in our last issue (page 17), Messrs. A. P. Dean & Cawdell inform us that the plant described was made to their instructions and supplied to them.

### British Plant for Polish Railways

A contract has been signed between the Polish Under-Secretary of State in the Ministry of Finance and the English Electric Co., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd., for the electrification and completion of the main Warsaw railway junction. The value of the contract is stated to be about £1,980,000 and the work will be carried out during the next four years, part of the equipment being supplied by the two companies mentioned.

### E.D.A. at the Royal Sanitary Exhibition

At the Royal Sanitary Institute Congress Exhibition held recently at the Winter Gardens, Blackpool, the British Electrical Development Association and the Blackpool Corporation Electricity Department joined forces in producing a very attractive exhibit, a section of which is illustrated below. The treatment of the facia is particularly interesting as, instead of the customary lettering, silhouette drawings were used

**A portion of the joint exhibit of the E.D.A. and the Blackpool Electricity Department at the R.S.I. Exhibition**

depicting electrical distribution and applications; the pictures were produced in the form of an illuminated box sign surmounted by a rising sun in neon tubing. The arrangement of the stands generally formed an admirable setting for the demonstrations of all kinds of electrical appliances.

### Domestic Electric Service

The above is the title of a neat folder issued by the Newhaven & Seaford Electricity Co., Ltd. It contains ten sheets, one of which sets out the domestic tariff (which includes a running charge of ¾d. per kWh), and another explains its advantages in the simplest terms. Each of the remaining sheets gives the main points in favour of a popular piece of apparatus (which is illustrated) and, in some cases, its cost. A business-reply card is also enclosed; this makes a request for further information or an interview, and intimates that an iron, a kettle, or a bowl fire may be obtained for a week's free trial. The inside of the front cover states the terms upon which cookers may be hired and gives the voltage and frequency of supply (information that is frequently omitted from publicity literature), with a note that the supply is controlled and so is suitable for electric clocks.

### Italian Electrical Imports

The imports of electrical machinery, apparatus and cognate material into Italy during the three months ended with March last attained a value of £366,000 as compared with £570,675 in the corresponding period of 1932. There was also a decline in the exports of similar material from Italy—from £462,675 to £168,325.

### A Hotpoint Display

The accompanying illustration shows a window display which has been prepared by the Hotpoint Electric Appliance Co., Ltd., at Crown House, Aldwych, W.C. Special attention is drawn to the company's constant hot water unit, and in

**A Hotpoint display**

the centre of the window is a water tank which has been cut away to show the simplicity of fitting the unit.

### Gas Companies and Municipal Houses

The Bills promoted by the Commercial Gas Co. and the Gas Light & Coke Co. which have already passed the House of Commons, went through the committee stage in the House of Lords on July 6th. Both companies seek to prohibit local authorities in their areas of supply from imposing conditions as to the form of light, heat, power and energy to be installed in municipal houses. The petitions lodged against the measure had all been withdrawn and the Bills were dealt with by Lord Onslow, Chairman of Committees, as unopposed measures. Only formal evidence was given in proof of the preamble and the Bills were ordered to be reported to the House for third reading.

### An Advertisement Correction

In the Pirelli-General Cable Works, Ltd.'s advertisement in our issue of June 23rd (Supplement, p. 21) reference was made to the "deputy borough engineer." This should have read "late deputy borough *electrical* engineer."

### The Aldwych All-electric Cottages

Owing to sustained interest and in response to many requests from the Provinces, it has been decided to retain the £225 demonstration cottages erected on the Aldwych site, Strand (see June 23rd issue, p. 913), and to continue the Housing Exhibition at the Building Centre, 158, Bond Street, until July 29th.

### Prices of Materials

Messrs. Edward Till and Co. report, July 12th: India-rubber, Para fine, 5⅜d., ¼d. dec.

Messrs. James & Shakespeare report, July 12th: Copper bars (best selected), sheet and rod, no change; English pig lead, £14 15s., 5s. dec.

Messrs. F. Smith & Co. report, July 12th: Electrolytic copper bars, £43, £1 10s. inc.; electrolytic copper sheets, £68, £4 inc.; electrolytic copper wire rods, no change; electrolytic copper h.c. wire, 7⅛d., ⅛d. inc.

### For Sale

Londonderry Electricity Department has generators, etc., for disposal.

(See our classified advertisements.)

### Works Visit

Members of the Association of Mining Electrical Engineers recently paid a visit to the Bradford Works of the English Electric Co., Ltd. The visitors, numbering 180, among whom were many ladies, included Mr. F. Beckett, president of the A.M.E.E., and Mr. Ainsworth, president-elect. The visitors were conveyed by motor coaches from Blackpool to Bradford, and had luncheon *en route* at the Troutbeck Hotel, Ilkley. On arrival at Bradford, the visitors were officially welcomed on behalf of the company by Mr. L. J. Sarjeant, the works manager. The visitors were shown the various stages of manufacture of industrial and traction motors and control gear, and through the domestic and heating section showing the mass production of cookers and fires. Exhibits of special interest to mining electrical engineers were on view. After the tour the visitors were entertained to tea.

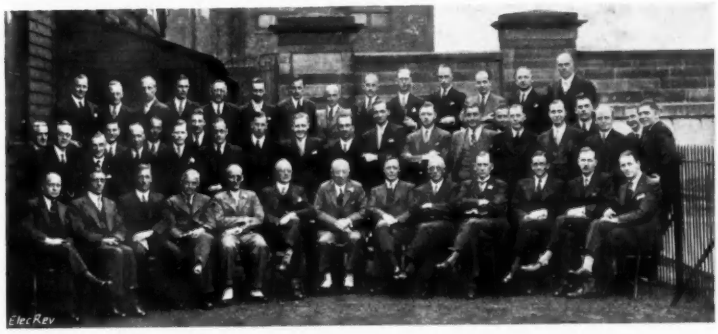
A party of journalists accredited to the Economic Conference visited the Trafford Park factory of the Metropolitan-Vickers Electrical Co., Ltd., on July 8th, passing through the large machine departments, foundry, welding shop, and meter departments, and they were given a demonstration of a million-volt arc in the high-voltage laboratory.

## Trade Announcements

The Engineering Department of the Western Electric Co., Ltd., has approved the use of the "Nife" nickel cadmium alkaline accumulator, made by Batteries, Ltd., Redditch, for the operation of its sound equipment.

Mr. M. E. J. Gheury de Bray, F.P.S., informs us that he has commenced an agency for patents, trade marks and designs under the style of "The Imperial Patent Service," at First Avenue House, High Holborn, W.C.1.

Mr. J. Davis, a former director of the Davis Electrical Co., Ltd., has taken over from the liquidator the stock of that company, and has opened offices and a showroom at 15, Percy Street, W.1. He asks for trade lists.



**Members of the Home Sales Organisation of Lancashire Dynamo & Crypto, Ltd., at the Sales Conference held at the company's Trafford Park works on June 15th and 16th**

Messrs. David Brown & Sons (Huddersfield), Ltd., are closing their works for the annual summer holidays from July 14th until July 24th.

Messrs. Bruce Peebles & Co., Ltd., have appointed Messrs. Ritchie, Hart & Co., Ltd., Mountpottinger Foundry, Belfast, agents for the sale in Northern Ireland of Bruce Peebles rotating electrical machinery, static transformers, steel cylinder and glass bulb mercury arc rectifiers and "Rectigors."

As from July 11th, the business of Technical Designs, Ltd., will be conducted from its old address at 71, Lincoln's Inn Fields, W.C.2, instead of 161a, Strand.

## French Electrical Import Quotas

The French *Journal Officiel* contains a series of Orders, dated June 30th, fixing the quotas for the import of certain products into France during the period July 1st to September 30th. According to the *Board of Trade Journal* these include the following electrical material:—

| | Quintals |
|---|---|
| Dynamo-electric machines, industrial electric transformers and rectifiers... | 6,672 |
| *United Kingdom share* ... ... ... ... ... ... ... ... | *582* |
| Apparatus for cutting off, regulating, protecting and distributing electric current— | |
| (*a*) Non-automatic apparatus... ... ... ... ... ... ... | 1,748 |
| *United Kingdom share* ... ... ... ... ... ... ... | *236* |
| (*b*) Automatic apparatus ... ... ... ... ... ... ... | 1,649 |
| *United Kingdom share* ... ... ... ... ... ... ... | *464* |
| Electric heating apparatus, including stoves ... ... ... ... ... | 1,088 |
| *Share for "other" countries, including United Kingdom* ... ... ... | *237* |
| Vacuum cleaners and polishers ... ... ... ... ... ... ... | 222 |
| *Share for "other" countries, including United Kingdom* ... ... ... | *28* |
| Electric measuring apparatus ... ... ... ... ... ... ... | 146 |
| *United Kingdom share* ... ... ... ... ... ... ... ... | *20* |
| Transformers for the above ... ... ... ... ... ... ... | 37 |
| *Share for "other" countries, including United Kingdom* ... ... ... | *1* |
| Electric accumulators and parts... ... ... ... ... ... ... | 1,812 |
| *United Kingdom share* ... ... ... ... ... ... ... ... | *374* |
| Radio valves ... ... ... ... ... ... ... ... ... | 663 |
| *United Kingdom share* ... ... ... ... ... ... ... ... | *129* |
| Radio telegraph and telephone apparatus ... ... ... ... ... | 4,793 |
| *United Kingdom share* ... ... ... ... ... ... ... ... | *70* |
| | Kg. |
| Incandescent vacuum lamps ... ... ... ... ... ... ... | 4,577 |
| *Share for "other" countries, including United Kingdom* ... ... ... | *75* |

## Glass-marking Pencils

The Royal Sovereign Pencil Co., Ltd., Neasden, N.W.10, has sent us samples of its "Chinagraph" pencils. These are made in six colours and possess the property of marking celluloid, china, glass and other hard polished substances. The makers suggest that one use is for the dating of electric lamps by retailers upon sale.

## Philips in Switzerland

The Société Usines Radio-Philips has just been formed at Chaux-de-Fonds with a share capital of 500,000 fr. for the production of electrical apparatus of various kinds.

## Poland's Manufacturing Progress

According to a Polish official announcement the electrical manufacturing industry of that country has in recent years taken up the production of automatic telephones with cash collecting boxes, automatic safety devices for railway crossings, short-wave radio transmitters, and radio transmitters for ships. Lately the Polish electric lamp manufacturing industry has been able to furnish 85 per cent. of the country's needs, and imports now consist almost exclusively of special lamps for medical uses, motor cars, and cinemas. The market is virtually dominated by the branch factories of the Philips, Osram and Tungsram concerns.

## Trade with Germany

The organisers of the Leipzig Fair, 6, Liebigstrasse, Leipzig, have sent us a copy of section C of the "W.E.Z. Export Directory," which contains the addresses of the principal German exporters of machinery, electrical and radio equipment, heating and other apparatus.

## Manchester Coal Exhibition

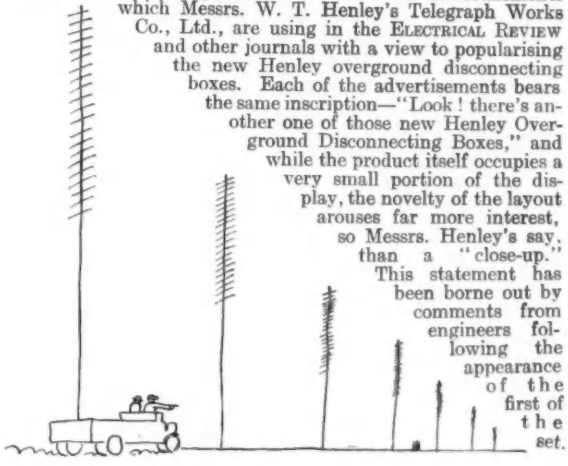
Judging by the exhibits at the Coal Exhibition, which was opened in Manchester on July 8th, and which will remain open until to-morrow (15th), good progress is being made with electrical equipment in mines. Messrs. Mather and Platt are exhibiting a 4 ft. 6 in. three-stage "Plurovane" pump driven by one of their L9/180 drip-proof motors of 100 h.p., which has been specially constructed for the White Moss Colliery Co. A "Prior Mastoker" exhibited by Saunders & Taylor, Ltd., illustrates the application of electricity to completely automatic underfeed stoking. This stoker can be applied to boilers rated at from 150,000 to 2,000,000 B.th.u. per hour. Metropolitan-Vickers Electrical Co., Ltd., is showing electrically operated drills lent by Messrs. Charles Croften & Co. for exhibiting in conjunction with the latest type of double drill controller unit. Two types of drill are shown, one of the rotary type and the other of the combined rotary and percussion type. Both are fitted with an automatic switching apparatus. The "MU 80," the latest type of "Metrovick" air-break control unit, is shown with pilot core protection, as well as other electrical equipment for collieries. In the extensive exhibit of lamps and safety devices was included a method shown publicly for the first time, which allows for a system of electric lighting to be supplied from ordinary mains underground. This system has been invented by Mr. H. O. Dixon, of the Westhoughton Coal and Cannel Co.; the mains are surrounded by compressed air, supplied by a small motor driven air-compressor.

## Registered Contractors Only

Mr. R. W. Willis, M.I.E.E., the electrical engineer and manager of the Cheadle and Gatley undertaking, tells us that at its last meeting his Council approved a recommendation by the Electricity Committee that any electrical work carried out on behalf of the Council (including assisted-wiring installations) should be entrusted to contractors on the National Register.

## Something New in Advertising

Below appears a specimen of a series of advertisements which Messrs. W. T. Henley's Telegraph Works Co., Ltd., are using in the ELECTRICAL REVIEW and other journals with a view to popularising the new Henley overground disconnecting boxes. Each of the advertisements bears the same inscription—"Look! there's another one of those new Henley Overground Disconnecting Boxes," and while the product itself occupies a very small portion of the display, the novelty of the layout arouses far more interest, so Messrs. Henley's say, than a "close-up." This statement has been borne out by comments from engineers following the appearance of the first of the set.



*"Look! there's another one of those new Henley Overground Disconnecting Boxes"*

## A Radio Communication Development

The International Marine Radio Co., Ltd., which recently took over the radio services of the Cunard Line, has now entered into an agreement to operate the entire radio services of the Anchor Line (Henderson Bros.), Ltd. The International Marine Radio Co. proposes to invite the Anchor Line radio staff to enter its employment.

## Social Events

The M-V Cosmos Lamps London office met the Gravesend Corporation Electricity Department on the Hillside ground, Gravesend, for cricket and tennis, on July 1st. An enjoyable afternoon was spent, the results being: Cricket: M-V 90, Gravesend 65; tennis: M-V five matches, Gravesend three.

The fifteenth annual sports and gala of Henley's Gravesend Sports Club was held at the company's ground, Craggs Farm, Singlewell, on July 8th. At the same time over 500 children were entertained at the annual treat, which included a tea, roundabouts, cokernut shies, and "all the fun of the fair." The programme also included a baby show. Among those present were Sir George Sutton, who saw the Armouring Department carry off, for the fourth year in succession, his tug o' war challenge cup, Sir Montague and Lady Hughman,

**Sir George Sutton, Sir Montague Hughman and Lady Hughman and friends at Henley's sports**

with their son Trevor, Mr. W. F. Bishop, Mr. A. H. M. Jacob and his daughter Joyce, Mr. R. O. Wright, who came straight from hospital, and Mrs. Wright, Mr. and Mrs. E. E. Judge, Mr. and Mrs. D. I. Evans, and Mr. and Mrs. W. C. Barry. Lady Hughman presented the prizes and Sir Montague, in thanking everyone for their kind reception, said that the City Livery Club, who recently visited Gravesend Works, had offered a challenge trophy for competition between teams from Head Office, Woolwich Works and Gravesend Works. Later in the evening a dance was held in the sports pavilion.

## North Wales Power Co. Fined

Fines of £5 on each of two summonses were imposed upon the North Wales Power Company at Colwyn Bay Police Court on July 5th for alleged breaches of the Factory Act electrical regulations. The cases had been remitted from the High Court for adjudication, and were a sequel to a fatality in the Colwyn Bay sub-station in October, 1932. The summonses had been dismissed by the Colwyn Bay bench, and an appeal by the Inspector of Factories followed, with the result indicated.

## New Catalogues and Lists

**A. Reyrolle & Co., Ltd.,** Hebburn-on-Tyne.—Pamphlet No. 783, describing Messrs. J. H. Holmes's "Castle" sine-wave alternator-sets for the accurate testing and calibration of meters.

**Reliance Telephone Co., Ltd.,** 12-13, Henrietta Street, W.C.2. —An illustrated folder drawing attention to the company's automatic intercommunicating telephones.

**Fredk. J. Gordon & Co., Ltd.,** 92, Charlotte Street, W.1.—A booklet containing illustrated particulars of "J.B.P." high-pressure greasers.

**The National Lighting Co., Ltd.,** 19, St. Bride Street, E.C.4.—A comprehensive catalogue of lighting fittings, electric fires and domestic appliances. Illustrated and priced.

**Milne & Longbottom,** Elm Works, Mere Lane, Rochdale.—A leaflet giving details of the "Elm" desk light.

**Power Specialities, Ltd.,** Viaduct Works, Wexham Road, Slough, Bucks.—An illustrated leaflet describing the "Roto-scythe" electric lawn mower.

**Davy Brothers, Ltd.,** Park Iron Works, Sheffield.—A 64-page booklet illustrating the company's rolling mill and hydraulic machinery, etc.

**Brook Motors, Ltd.,** Empress Works, Huddersfield.—An abridged stock list (No. 354) of a.c. motors and list No. 351, detailing hire-purchase terms and conditions.

**Revo Electric Co., Ltd.,** Tipton, Staffs.—A leaflet giving particulars of the new "Revocole" imitation coal fire.

**Armorduct Cable Co., Ltd.,** 159, Westminster Bridge Road, S.E.1.—A trade list of "Armorduct" cables.

**Ferranti, Ltd.,** Hollinwood, Lancs.—A catalogue (No. H.J. 33) illustrating and describing several new electric fires.

**General Electric Co., Ltd.,** Magnet House, Kingsway, W.C.2.—Booklet No. OS. 6542, giving a description of the "Osram" photo-cell relay unit and a number of its industrial applications.

**Simmonds & Stokes, Ltd.,** 4, Vernon Place, Southampton Row, W.C.—A comprehensive illustrated price list (pp. 114) of couplings and plugs for electric cables, &c.

**Ateliers de Constructions Electriques de Charleroi,** 56, Victoria Street, S.W.1.—July stock list of the company's motors, &c.

**Electric Furnace Co., Ltd.,** 17, Victoria Street, S.W.—A fully illustrated brochure of various types of melting furnaces installed by the company.

**Buck & Hickman, Ltd.,** 2, 4 & 6, Whitechapel Road, E.1.—A pamphlet illustrating and describing the "Roebuck" automatic staking machine for riveting with hollow rivets.

**British Insulated Cables, Ltd.,** Prescot, Lancs.—A leaflet (No. P.F. 109), describing wet type electrolytic condensers for radio smoothing purposes.

**W. T. Henley's Telegraph Works Co., Ltd.,** Holborn Viaduct, E.C.1.—A 44-page illustrated booklet relating to the Henley mural service and distribution system.

## Bankruptcy Proceedings

**J. D. Drury** (Mersey Electrics and Drury Bros.), electrical engineer, 23, Strathmore Drive, Great Crosby, nr. Liverpool.—First and final dividend of 3s. 5½d. in the £, payable July 13th at National Bank Building, Fenwick Street, Liverpool.

**F. M. Clarke,** electrical engineer, 3, Joyce Avenue, Sherwood, Nottingham.—The public examination of this debtor was held on July 6th at the County Court House, Nottingham, when a deficiency of £147 was disclosed. Debtor attributed his failure to the effects of a motor accident which incapacitated him for four months. The examination was closed.

**C. H. Lawson,** electrical contractor, 1079, Chester Road, Stretford, Manchester.—Trustee, Mr. F. Murgatroyd, Byrom Street, Manchester, Senior Official Receiver, released June 20th.

**D. S. B. Shannon,** electrical engineer, Carlton Chambers, Lichfield Road, Mere Green.—Last day for receiving proofs for dividend July 21st. Trustee, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

**H. C. Mealing** (Yorkshire & Lincolnshire Electric Development Co.), 73, Lawrence Street, York.—Last day for receiving proofs for dividend, July 22nd. Trustee, Mr. D. S. Mackay, the Red House, Duncombe Place, York, Official Receiver.

**S. C. Speller,** wireless dealer, 14, Lanchester Street, W.—This debtor attended recently at the London Bankruptcy Court with his wife, and they passed their public examination upon joint accounts showing liabilities of £1,955, against assets of £144. The debtors attributed their failure to depreciation in value of stock and trade effects and to loss in trade arising from the general depression. The examination was concluded.

**H. Parker,** wireless dealer, 10, Stratford Street, Nuneaton, Warwickshire.—A receiving order was made recently on the debtor's own petition, when the statement of affairs showed liabilities of £221 and assets of £35, leaving a deficiency of £186. The position is attributed to loss due to depreciation of stock, lack of capital, and bad trade. At the first meeting of creditors, the case, being a summary one, was left in the hands of the Official Receiver as trustee.

**H. F. Griffiths,** electrical engineer, 19, Mount Pleasant, Bilston, Staffs.—The public examination herein was held recently, at the County Court, Wolverhampton, when the statement of affairs which was presented showed a deficiency of £556. The position was attributed to want of capital, loss in trade due to keen competition, and insufficient income to meet living expenses. The matter was left in the hands of the Official Receiver, as trustee.

**S. Gillitt** (G.E.T. Electrical Supplies Co.), electrical goods dealer, "Lansdowne," Offerton Lane, Offerton, nr. Stockport. —Trustee, Mr. R. K. Clark, Byrom Street, Manchester, Official Receiver, released June 19th.

**A. E. Hilton,** electrician, 104, Carolgate Bridge, Retford.—Last day for receiving proofs for dividend, July 18th. Trustee, Mr. E. C. Midgley, 1, St. Swithin's Square, Lincoln, Official Receiver.

## Private Arrangement

**D. Davis,** wireless dealer, 64, Coborn Road, Bow, London, E.3.—A meeting of creditors was held recently at the offices of Messrs. H. Rainsbury & Co., 20-21, Broad Stret Avenue, E.C., when the statement of affairs showed liabilities of £1,596, and assets of £240, leaving a deficiency of £1,356. It was decided that a deed of assignment should be executed to Mr. Rainsbury as trustee. A committee of inspection was also appointed, consisting of Mr. Ball, of the Marconiphone Co., Ltd., Mr. Enever, and Mr. W. A. J. Osborne, representing the Columbia Graphophone Co., Ltd. The following are principal creditors:—Marconiphone Co., Ltd., £502; I. Bennett & Co., £160; Columbia Graphophone Co., Ltd., £121; General Electric Co., Ltd., £76; Brown Bros., Ltd., £61.

## Company Liquidations

**Fred Dawson & Co., Ltd.,** electrical and wireless factors, 9, Mill Hill, Boar Lane, Leeds.—A meeting of creditors was held on July 5th, at the Hotel Metropole, King Street, Leeds. The statement of affairs showed liabilities of £6,581 and net assets of £3,274, leaving a deficiency of £3,307. Mr. Wardle, the receiver for the debenture holder, said that in 1915 Mr. Fred Dawson carried on business in partnership. A dissolution took place in 1919. The business had done a turnover of roughly £20,000 to £25,000 per annum, and during 1929 and 1930 showed profits. In the twelve months to September, 1931, the turnover fell to £16,447, and a net loss was sustained of £1,115. In the succeeding twelve months the sales were £15,739, with a net profit of £485. Since September, 1932, no accounts had been prepared, but it was estimated that a net loss of about £813 had been incurred. Last March the company was pressed, and arrangements were made to pay the whole of the liabilities over a period. One creditor would not agree and a receiver was appointed on April 29th. A resolution was passed confirming the voluntary liquidation with Mr. C. Turner, 155, Norfolk Street, Sheffield, as liquidator with a committee.

The following are creditors: Electric Lamp Factors, £403; General Electric Co., Ltd., £195; George Becker, Ltd., £129; Foster Engineering Co., £152; Scupham, Wood & Co., £144; Block Batteries, Ltd., £199; Derby Cable Co., Ltd., £306; Warrington Cables, Ltd., £115; Kark Limes, £225; Lighting Trades, Ltd., £354; Fontain & Co., Ltd., £221; Revo Electric Co., Ltd., £109; Fuller Accumulator Co., Ltd., £206; Metropolitan Electric Cables, £304.

**Harold Cooper & Sons, Ltd.**—Winding up voluntarily. Liquidator, Mr. E. P. Dutton, Victoria Chambers, Bowlalley Lane, Hull.

**South Metropolitan Electric Tramways & Lighting Co., Ltd.,** and the **London & Suburban Traction Co., Ltd.**—Winding up voluntarily. Liquidator, Lord Ashfield, 55, Broadway, Westminster, S.W.

**Sea Houses & District Electric Supply Co., Ltd.**—Winding-up voluntarily. Liquidator, Mr. W. Sparks.

# Electricity Supply

## Lighting, Domestic, Power

**Ashford (Kent).**—SUPPLY TO EGERTON.—The Urban District Council is taking steps to give a supply of electricity to the village of Egerton by next year.

**Australia.**—SUPPLY IN N.S.W.—A proposal has been submitted to the Clarence River County Council by Mr. N. V. S. Wilton, the chief engineer and manager of the electricity undertaking, to divide New South Wales into nine zones for the distribution of electricity through zonal boards, the generation and bulk transmission being undertaken by a greater council.

**Barrow-in-Furness.**—DOMESTIC APPARATUS.—The Electricity Committee has received sanction to the borrowing of £5,000 for domestic apparatus.

OVERHEAD LINES.—The Ministry of Transport has consented to the placing of overhead lines in the urban district of Dalton and the urban and rural districts of Ulverston in connection with supplies of electricity to Staveley, Lindale, and the Gascon Estate, Ulverston.

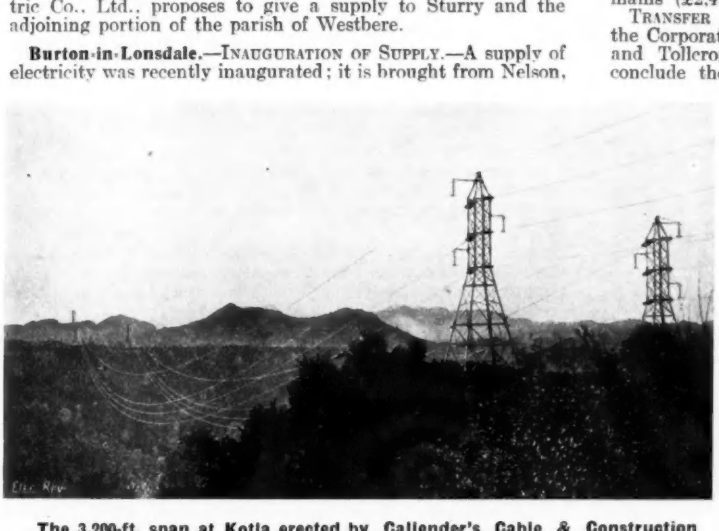
**Birkenhead.**—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to loans of £15,000 for wiring and £1,500 for apparatus.

**Birmingham.**—REPORT ON THE YEAR.—Alderman Sir Percival Bower, chairman of the Birmingham Electric Supply Committee, in presenting the annual report and statement of accounts at a recent meeting of the City Council, said that their scheme for dealing with dust and other emissions from their stacks at the power stations had been approved by the Central Electricity Board, and their loan sanction granted by the Electricity Commissioners. They would proceed to place the necessary contracts and put the work through as expeditiously as possible. He would like to see a development in the direction of railway electrification in and around Birmingham. Reasons could be adduced in support of such a development, and they would be pleased to meet the railway authorities at any time and to do their best to arrange matters on lines that would prove advantageous to all concerned.

**Blackpool.**—RECORD NUMBER OF CONNECTIONS.—The Electricity Department's surplus of £32,302 for the year ended March 31st was £9,000 more than estimated. Of the surplus, £11,389 goes to relief of rates. The number of consumers connected during the year reached the record figure of 2,589, making a total of 25,796.

**Blean.**—EXTENSIONS.—The Kent Electric Power Co., Ltd., is constructing a h.p. line from St. Stephen's (Canterbury) through Blean to Whitstable, and a l.p. line is to be erected along the Canterbury-Whitstable Road to Blean. In another part of the Rural Council's district the South-East Kent Electric Co., Ltd., proposes to give a supply to Sturry and the adjoining portion of the parish of Westbere.

**Burton-in-Lonsdale.**—INAUGURATION OF SUPPLY.—A supply of electricity was recently inaugurated; it is brought from Nelson,



**The 3,200-ft. span at Kotla erected by Callender's Cable & Construction Co., Ltd., in connection with the Uhl River hydro-electric scheme. The company was responsible for the whole of the vast network of transmission and distribution lines**

37 miles away. The charges are 8d. per kWh for lighting, and 1½d. for power.

**Chesterfield.**—NEW SUB-STATIONS.—The Town Council is to erect two new sub-stations at a cost of £1,870.

ALTERNATIVE BUSINESS CHARGE.—The following alternative scale of charges for business premises has been adopted:—£12 per kWh per annum of maximum demand, plus ¾d. per kWh. Consumers under this scale will be precluded from adopting in addition the shop-window lighting rate of 1½d. per kWh.

**Coventry.**—YEAR'S WORKING.—The Electricity Department reports a net profit of £57,520 for last year, an increase of £18,966 as compared with the previous year, due principally to the lower cost of production and a reduction in capital charges consequent upon decreased loan debt. Electricity sold amounted to 103,406,017 kWh, an increase of 11,763,763 kWh.

MAINS AND PLANT.—The Electricity Committee is to apply for sanction to borrow £4,111 for mains and plant.

**Dundee.**—FURTHER CONCESSIONS.—As a result of the satisfactory financial position of the Electricity Department, concessions amounting to about £10,000 a year are to be made to consumers. For ordinary lighting non-contracted supplies it is proposed to reduce the rate from 4½d. to 3¾d. per kWh, and for small power and heating from 2d. to 1½d. A total of 46,574,151 kWh was consumed last year.

**Eastbourne.**—CANVASS OF HANKHAM AREA.—A canvass is to be taken in the Hankham area to ascertain the demand for electricity.

**Edwinstowe.**—REDUCED CHARGES.—The Bolsover Colliery Co. has reduced its charges for the public supply of electricity from 6d. to 5½d. per kWh for lighting, and from 2d. per kWh to 1½d. for heating and power.

**Galloway.**—PROGRESS OF TUNNEL.—Another stage in the construction of the Glenlee Tunnel, which is being driven through the Galloway Hills for the Galloway Water Power Co. in connection with its hydro-electric scheme was completed last week, when a junction was effected between Craigshinnie shaft and the adit, a distance of 1¼ miles. The charge was fired by Mr. J. Carmichael, son of the contractor. Since the work started a year ago, such remarkable progress has been made that already 3¼ miles have been driven. The engineers for the scheme are Sir Alex. Gibb & Partners.

**Glasgow.**—YEAR'S WORKING.—The Corporation Electricity Department has had a successful year notwithstanding the falling-off in the power supply. The gross revenue for the year amounted to £1,257,784 and the working expenditure to £568,617, the net revenue being £689,167, and the net profit £134,983. On the revenue side there was a decrease of £19,346 on the previous year's figures. There was also a reduction in total amount sold of slightly more than 2,000,000 kWh, equal to 0.9 per cent. The reduction in power was 9,000,000 kWh, against which there were increases of 4,000,000 kWh in domestic sales and 3,000,000 kWh in business sales. The falling-off of over £19,000 in the revenue arose from the recent reduction made in the commercial lighting primary rate. The surplus for the year has been transferred to appropriation of surplus revenue account, out of which the following expenditure has been met: Special capital expenditure, £25,591; change-over from d.c. to a.c., £59,785; reconstruction of head offices, £10,270; leaving a balance of £39,336 to be carried forward to next year. Comparative figures show the progress of the department during the past five years. The number of consumers increased from 74,122 to 119,627, and the electrical energy sold from 220 million to 235 million kWh.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains (£2,477).

TRANSFER OF SUPPLY AREA.—Regarding the taking over by the Corporation of the supply of electricity in the Shettleston and Tollcross area, the Electricity Committee proposes to conclude the negotiations with the Clyde Valley Electrical Power Co. on the following lines: (1) That a payment be made to the company for goodwill and assets in respect to the company agreeing (a) to cancel the bulk supply agreement; (b) not to compete with the Corporation in the supply of electricity in the area; and (c) to hand over to the Corporation the mains belonging to the company in the area; and (2) that the Corporation agree not to proceed farther with its claim for a share of the profits made by the company in connection with the supply of electrical energy within the area prior to the Corporation taking over the supply.

**Guildford.**—LOAN.—The Town Council is to carry out a scheme for the provision of electricity to Wood Street by overhead lines at an estimated cost of £2,070, for which sum a loan is to be applied for. The consent of the Rural District Council and the Ministry of Transport for the erection of overhead lines is to be sought.

**Hull.**—LOANS.—The Electricity Committee has obtained sanction to the extension of the generating station and the borrowing of £12,600. Application has been made to borrow £75,000 for mains and £25,000 for sub-stations.

PARTIAL CLOSING OF SCULCOATES STATION.—The Central Electricity Board has given instructions for the shutting down of Sculcoates power station on Sundays and each night from midnight to 6 a.m. It is anticipated, however, that, with further substantial economies in operation to be effected shortly, the station will resume continuous running.

**India.**—MYSORE.—According to a recent statement made by the Dewan of Mysore, hydro-electric power in the State has spread over a wide area and, besides the two cities of Bangalore and Mysore and the Kolar gold fields, nineteen towns and 143 villages are now using it for various purposes. The total investment amounts to nearly Rs. 3 crores.

UNITED PROVINCES.—Remarkable progress in the use of electrical power is reported in the United Provinces for the past

year. The total revenue rose from Rs. 7 lakhs in 1931-32 to Rs. 10½ lakhs in 1932-33, and it is estimated that the revenue will rise to Rs. 13 lakhs in the current year. There are now about seventy-five private tube wells irrigating nearly 4,000 acres and nineteen State tube wells in three districts utilising electric power. About twenty-five sugar-crushing and refining plants are now in operation, and many new consumers are being connected. Over 8,000 acres of sugar cane are irrigated from the Ramganga canal alone. There are nearly eighty-five miles of rural branch line serving eighty-three consumers.

**Leeds.**—HIRE AND HIRE-PURCHASE.—The minimum value of domestic electrical apparatus which can be acquired on hire-purchase terms is to be reduced from £10 to £5, payments being spread over a period not exceeding three years. Self-contained electric water heaters will be obtainable on simple hire on terms to be fixed, while small electric cookers of the "kitchenette" size are to be issued on simple hire at 6s. per quarter for the first two years and thereafter at a minimum of 4s.

**The Torquay Town Hall floodlighted by means of "Osira" fittings, and a part of the front also illuminated by G.E.C. gas-discharge lamps**

**Marple.**—LOAN.—The Gas and Electricity Committee proposes to apply for sanction to borrow £5,000 (£4,000 for mains and services and £1,000 for meters), the estimated amount to cover the Council's requirements for the next three years.

CANVASS OF CUSTOMERS.—The Urban District Council has decided to make a canvass of the tenants of the Council houses to ascertain whether they desire the installation of electricity in their houses.

**New Zealand.**—HUTT VALLEY REPORT.—The development of the Hutt Valley Electric Power Board's business, particularly in the industrial section, has been considerably affected by the depression, states Mr. E. F. Holland, engineer and general manager, in his annual report. Sales of energy show a decrease from 20,340,620 to 19,953,843 kWh, and the total revenue from £112,475 to £111,051; the net profit was £5,613. In spite of the adverse conditions, however, the year saw an increase of 302 in the number of consumers, bringing the total up to 11,192.

**Poland.**—REPORT OF PROGRESS.—According to the recently issued report of the Société Belgo-Polonaise de Force et de Traction Electriques ("Sobelpol"), the five power stations in Poland controlled by the company have now an aggregate capacity of 97,400 kW as compared with 81,400 kW at the end of 1931. Owing to the industrial depression, the output of the five stations only reached a total of 106,751,718 kWh in 1932 as against 112,244,478 kWh in 1931, a decrease of 4.9 per cent. The area over which the company has the concession for the supply of power has a population of 744,447, and the mains laid now have a length of about 970 miles.

**Rotherham.**—AN ALTERNATIVE ASSISTED-WIRING SCHEME.—The Electricity Committee, as an alternative assisted-wiring scheme, recommends that for an experimental period of about a year houses up to five rooms with five lights or four lights and a wireless plug be offered the following alternative to the present assisted-wiring scheme: For the payment of 1s. per week the department to install and maintain the wiring and fittings, including lamps, and supply all electricity required to a limited demand of about one ampère. Should the scheme be cancelled at or before the expiration of the experimental period, the consumer to be automatically transferred to the present system.

**St. Albans.**—ELECTRICITY FOR BATFORD.—The Rural District Council has approved a scheme submitted by the North Metropolitan Electric Power Supply Co. for affording a supply of electricity to Batford.

**Sheffield.**—AGREEMENT WITH STEEL COMPANY.—The Corporation has concluded an agreement with Messrs. Thos. Firth & John Brown, Ltd., of Sheffield, under which the company will scrap its generating station, which cost over a quarter of a million sterling, and take its supply of electricity from the Corporation. The agreement is for a minimum period of ten years. The company is to pay for electricity supplied a charge which is based upon kVA and a cost per kWh varying with the price of coal, with a minimum of £10,000 per annum. The company is also to bear the cost of all the internal work necessary.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £6,874.

**Sleaford.**—PROPOSED TARIFFS.—Regarding the Urban District Council's proposed tariff for domestic supplies, the Electricity Commissioners suggest an all-in tariff on the basis of the size of the house (floor area) instead of the proposed tariff on the rateable-value basis. The cost of the 25,460 kWh purchased from the Central Electricity Board during May averaged 0.376d. per kWh.

**South Africa.**—EXTENSION AT GRAHAMSTOWN.—The extension of the electricity scheme is estimated to cost £32,500, including the erection of a new power station.

**Southport.**—TARIFF REDUCTION POSTPONED.—The Electricity Committee proposed to introduce a reduced tariff, but, following a debate of the Town Council, the matter has been taken back for further consideration.

**South Shields.**—METER RENT REDUCTION.—The Electricity Committee has agreed to a reduction of meter rents because the amount collected in respect thereof for the past year was £2,648, whilst the cost of meter reading, inclusive of clerical work but exclusive of the cost of reading prepayment meters, amounted to £1,396.

**Stafford.**—REDUCED CHARGES.—The Town Council has decided to devote a sum of £5,000 to reducing the electricity tariffs during the present financial year.

LOAN.—It has also been decided to make an application for sanction to borrow £3,300 for the provision and laying of mains through the town.

**Stockton-on-Tees.**—YEAR'S WORKING.—The Electricity Committee reports a profit of £2,261 for last year.

NEW SUB-STATION.—A sub-station is to be erected in Oxbridge Lane.

**Stretford.**—STREET LIGHTING.—The Highways Committee is to obtain quotations from the gas and electricity boards for lighting the new streets on Mr. J. Maunders's Lostock housing estate.

**Torquay.**—OVERHEAD LINE.—The Electricity Committee is to erect an overhead h.p. cable between Modbury and Buckfastleigh at a cost of £8,326.

ELECTRIC CLOCKS FOR CORPORATION?—The General Purposes Committee has decided to ask the electrical engineer to report upon the question of installing electric clocks in place of the existing clocks owned by the Corporation.

**Tunbridge Wells.**—LOANS SANCTIONED.—The Town Council has received sanction to loans of £16,286 for mains and services, and £12,000 for consumers' wiring installations.

**Wolverhampton.**—NEW SUB-STATIONS.—The Electricity Committee is to erect a sub-station in Stafford Road at a cost of £1,059, and another at Woodthorne Estate costing £1,541.

TARIFF REDUCTIONS PROPOSED.—The Electricity Committee recommends tariff revisions which will represent concessions totalling £20,000 per annum.

**Worthing.**—LIGHTING OF ESPLANADE.—Twenty standards costing £25 each are to be erected in connection with the improved lighting of the esplanade. They have been designed by the borough engineer, who has been authorised to order the standards and proceed with the erection.

STREET LAMP TESTS.—The Lighting Committee has asked the borough engineer and the electrical engineer to make a thorough test of "combine" and "non-combine" lamps with regard to their relative suitability for street lighting.

LOANS.—Application is being made for sanction to borrow £20,000 for domestic electrical apparatus and £2,500 for wiring installations.

# Traction

**Birmingham.**—ANNUAL REPORT.—Alderman A. H. James, chairman of the Tramways and Omnibus Committee, presenting the annual report at a recent meeting of the City Council, stated that fifty trolley-omnibuses required in connection with the conversion of the Coventry Road tram route had been ordered from a local company at a cost of approximately £95,000. To combat the fall in revenue on the tramway side, rigid economies had been effected. They would, as a result of their progressive policy, still continue to run tramways where large portions of the population had to be transported from one part of the city to another.

**Hamilton.**—TRAFFIC CONTROL.—The Town Council is proceeding with the erection of an "Electromatic" system of street traffic control at the Old Cross, and has decided to install a similar control system at the New Cross (£1,127).

**Ilkeston.**—TROLLEY-BUSES.—The Nottinghamshire & Derbyshire Traction Co. is to run a service of trolley-buses in Church Street.

**Italy.**—RAILWAY DEVELOPMENT.—The loan of 600 million lire, which was over-subscribed in Italy in May for the execution of further works of electrification of the Italian railways, met with such success that a further loan of 500 million lire is now being offered for the same purpose for accelerating the work and finding employment for additional men.

**Leicester.**—FEWER TRAM PASSENGERS.—The revenue from the trams during the last twelve months amounted to £308,518, a decrease of £24,595, and the number of passengers carried (50,404,015) fell by 2,347,314.

**Manchester.**—INCREASED TRAMWAY SURPLUS.—In spite of a decline from £1,508,621 to £1,427,252 in revenue (due partly to general depression and partly to a conversion of several routes to bus operation), the Corporation tramways showed an increase last year from £25,245 to £48,665 in the net profit. Passengers carried numbered 248,518,259—21,041,158 fewer than in the preceding year. The introduction of "Cheap Travel" tickets has proved very popular.

**Middlesex.**—LIGHT RAILWAYS ORDER.—The Minister of Transport has made an Order authorising the construction of a light railway in the urban district of Finchley.

**South Africa.**—RAILWAY ELECTRIFICATION.—The South African Railway Administration has allocated £33,130 to be spent during the current financial year on the electrification of the line from Salt River to Bellville (Cape Province), and £20,000 on the electrification of the Daimana-Van Reenen-Harrismith line (Orange Free State).

**Southport.**—FALLING RECEIPTS.—Trade depression is said to account largely for the decline last year in tram passengers (from 9,096,833 to 7,563,267) and receipts (from £47,055 to £38,813). Reductions in working and capital expenditure enabled the tramway undertaking to show an increase from £6,097 to £7,508 in the net surplus.

**Switzerland.**—ELECTRIC TRACTION PROGRESS.—The Société de Banque Suisse has recently issued some interesting details regarding the progress made with the electrification of the Swiss Federal Railways during recent years. Thus, it is shown that, while the length of the system has, since 1926, remained at about 1,800 miles, the electrified sections have increased during the past six years from 931 to 1,134 miles, and the proportion of the total from 51.7 to 63.2 per cent. The electric loco-miles run advanced during the same period from 14,021,250 to 21,883,125. For an average electric train load of 310 metric tons, the average cost of electric power worked out at 0.928 Swiss fr. per locomotive-mile.

# Communications

**Algiers.**—TELEPHONY.—Telephone communication has now been established between Algiers and London. The first trials are stated to have been quite successful.—*Reuter* (Algiers).

**Australia.**—NEW WIRELESS STATIONS.—Details of the tenders for the four new broadcasting stations to be erected include the following:—Townsville, Queensland, power rating (unmodulated carrier power in the aerial), initial 5 kW, ultimate 20 kW; tuning range, 550-1,500 kc; operating frequency, 640 kc. Grafton, N.S.W., power rating, initial 5 kW, ultimate 20 kW; tuning range, 550-1,500 kc; operating frequency, 920 kc. Sale, Victoria, power rating, initial 2 kW, ultimate 10 kW; tuning range, 550-1,500 kc; operating frequency, 830 kc. Launceston, Tasmania, power rating, initial 2 kW, ultimate 10 kW; tuning range, 550-1,500 kc; operating frequency, 630 kc. Opening a new broadcasting station at Mildura, Victoria, the Postmaster-General, Mr. Parkhill, said it was the aim of the department to establish sufficient stations to ensure at least one national station being received satisfactorily in areas remote from the centres of population. Mr. Parkhill said, in the House of Representatives, that inquiries were being made into the question of erecting a station at Bendigo, Victoria.

**Dutch Indies.**—NEW RADIO STATIONS.—The Dutch Indies Broadcasting Company is to erect a new broadcasting station at Tandjong, and contemplates the erection of several other stations.

**Edinburgh.**—THE "ON-DEMAND" SERVICE.—The new "on-demand" equipment at Edinburgh briefly referred to last week is installed in the manual switchroom of the existing Central exchange, the switchboard comprising two suites. The demand suite has twelve positions, and the incoming and delay suite nine positions. Each suite has a six-panel outgoing-junction multiple of 160 lines and an auto-junction multiple of 200 lines with visual idle indicators. The trunk multiple has sixty lines, also with visual idle indicators. The eighty answering jacks on each suite are multipled every seven panels. Coin box subscribers who dial "0" will continue to be answered by the "A" operator, who, on ascertaining that a trunk call is required, will inform a trunk operator who has joint access to the line. The cord circuits are of the "sleeve control" type now standardised by the Post Office and fitted with chargeable time indicators. Both the original exchange and the trunk demand exchange have been manufactured and installed for the Post Office by Messrs. Siemens Brothers and Co., Ltd., Woolwich, who have also installed the whole of the eleven automatic telephone exchanges in the Edinburgh area.

**Hull.**—TELEPHONY.—The Corporation Telephones Committee reports that the gross profit for the year amounted to £45,031; after paying interest, loan charges, and income tax there remained a net profit of £17,434. The royalty tax paid during the year amounted to £12,169, making a total from the commencement of the service of £199,820. During the year the exclusive line and two-party line residence tariffs were reduced by £1 each per annum. The remainder of the manual subscribers in the city, with the exception of those with coin-box service, are being transferred to the automatic system. It would appear advisable, should the occasion arise, to limit the amount of capital expenditure contributed from revenue and reserve, so that the saving in operating charges which would accrue owing to the transfer of the remainder of the subscribers in the city to the automatic system could be used for small tariff reductions.

**India.**—TELEPHONY IN HYDERABAD.—Hyderabad, the largest state in India, is likely to extend the present telephonic facilities so as to place practically all towns in the State in direct communication with the capital (Hyderabad) and also with cotton centres in different parts of India. Alternative schemes are under consideration by the State Government. The first, which is estimated to cost Rs. 400,000, consists of laying a double line, which will incorporate the carrier system, to link Hyderabad through Sholapur (in Bombay Presidency) with all the Presidency towns in British India. At the cost of an additional Rs. 20,000, it is intended then to link up Hyderabad with London. The second proposal is to install a single line from Hyderabad to Wadi, along the railway lines, and thence to Sholapur.

**Japan.**—TELEPHONE COMMUNICATION.—Public telephone communication between centres in Japan proper and those of Korea was recently established by the Government Department of Communications. On the completion of the work of laying cables between Fukuoka (Kyushu) and Fusan (Korea) in the near future, an augmented scale of communication is expected to be achieved. Furthermore, trial communication by telephone between Tokyo and Mukden, or Dairen, has also been successful, and the Communications Department is now planning to open a public service shortly.

**Manchuria.**—COMMUNICATIONS AGREEMENT.—An agreement has been signed between Manchukuo and Japan whereby all electrical communications in the Kuantung leased territory, the South Manchuria Railway zone, and the rest of Manchukuo are brought under joint Japanese-Manchukuo control, says *Eastern Engineering and Commerce*.

**Portugal.**—TELEPHONY.—The Anglo-Portuguese Telephone Co., Ltd., has now seven telephone exchanges in operation in Lisbon, of which one is automatic, with a total of 18,050 subscribers. In addition, there are forty-two small exchanges in the suburban areas.

**Spain.**—NEW RADIO STATION.—Arrangements are well advanced for the installation of a broadcasting station at Bilbao. The premises, which are situated in the Carlton building, will be completed this month, when the technical apparatus will be erected. Testing will be started in August on a wavelength of 203 metres. The new station is to be inaugurated on September 15th.—*Reuter* (Bilbao).

**Sweden.**—TELEPHONY.—Stockholm is still one of the leading towns in the world as regards the number of telephones in relation to the population, having at the end of 1932 318 telephones for every 1,000 inhabitants.—*Reuter's Trade Service* (Stockholm).

**Switzerland.**—RADIO DEALERS' REGISTRATION.—New regulations of the Ministry of Posts and Communications which came into force on July 1st will permit registered dealers only to sell radio receivers and erect aerials. Such firms must have a licence, which will be issued only after owner and employés have passed a technical examination, and all staff changes must be notified to the local postal authority. The Ministry reserves the right to issue a list of approved sets; they must be so installed as to suffer the minimum of "outside" interference, and receivers which interfere with neighbouring sets (*i.e.*, direct reaction coupling) will not be permitted. The dealer must pay to the Postal Administration 5 fr. for each set he installs. According to *World Radio*, the funds so collected will be used for the suppression of electrical interference with radio reception.

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Australia.**—MELBOURNE.—August 1st. Posts and Telegraphs Department. Adhesive insulating tape. (A.Y. 11868.)*
September 5th. Telephone instrument cords. (A.Y. 11878).* Telephone switchboard cords. (A.Y. 11879.)*
September 12th. Telephone switchboard plugs. (A.Y. 11880.)*
August 29th. Radio measuring equipment. (A.Y. 11885.)*
State Electricity Commission. August 21st. Power, telephone and pilot cables. (A.Y. 11877.)*
September 12th. Four radio broadcasting stations at Townsville, Grafton, Sale and Launceston. The first two are to have an initial power of 5 kW each, with an ultimate power of 20 kW, while the others will have initial and ultimate powers of 2 and 10 kW.—*Tenders.*
August 14th. City Council. Fibre or glazed stoneware conduits. City electrical engineer (deposit £1 1s.).

**Bedford.**—July 24th. Electricity Department. Transformers. (July 7th.)

**Caithness.**—July 17th. Commissioners of Northern Lighthouses. Fog signal installations at Stroma and Buchanness lighthouses. Mr. Stevenson, engineer, 84, George Street, Edinburgh (deposit £2 2s.).

**Colchester.**—July 24th. Royal Eastern Counties Institution, Ltd. Electrical installation at new home for mentally defectives. (June 30th.)

**Dunfermline.**—July 19th. Town Council. Various works, including electric lighting, at forty-four houses. Mr. D. H. Shaw, burgh engineer (deposit £1 1s.).

**Eastbourne.**—July 24th. Electricity Department. 200-kVA and 300-kVA transformers. (See this issue.)

## Contracts Closed

**Aldershot.**—Town Council. Accepted. Installation of the Gamewell system of fire alarms (£1,220).—Standard Telephones & Cables, Ltd.

**Blackpool.**—Transport Committee. Accepted. Twenty-four tramcars.—English Electric Co., Ltd.
Electricity Committee. Accepted. Switchboard panel.—Switchgear & Cowans, Ltd. Switchgear.—English Electric Co., Ltd.

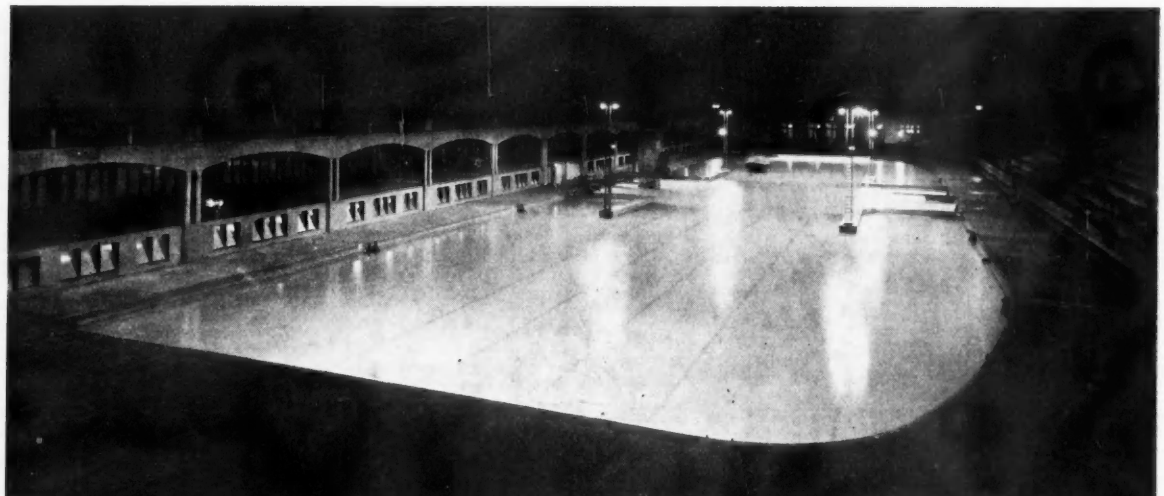
**Chesterfield.**—Electricity Committee. Accepted. E.h.p. cables (498).—Macintosh Cable Co., Ltd. Transformer kiosks (£322).—Brush Electrical Engineering Co., Ltd. E.h.p. switchgear (£181).—Switchgear & Cowans, Ltd. Alterations to e.h.p. feeder switchgear in works (£470).—British Thomson-Houston Co., Ltd. Alterations to induction regulators in Chatsworth Road works (£320).—English Electric Co., Ltd.

**Dartford.**—General Purposes Committee. Recommended. Wiring 112 houses on Heath Lane estate.—S. Edwards. Cable, etc., for Spital Street feeder link (£186).—Hackbridge Cable Co., Ltd. Cable, switchgear and transformers for supply to Bexley mental hospital (£1,260).—Johnson & Phillips, Ltd.

**Devizes.**—Rural District Council. Accepted. Wiring fifty-four houses for electric lighting (£162).—A. R. Fox.

**Dumfries.**—Corporation. Accepted. Switchgear (£1,080).—A. Reyrolle & Co., Ltd. Rotary converting plant at Leafield Road Works (£1,242).—Bruce Peebles & Co., Ltd.

**East Ham.**—Electricity Committee. Recommended. A.c. motors (£436).—Crompton Parkinson, Ltd.
Works Committee. Recommended. Fire alarm call point system (£2,296).—Standard Telephones & Cables, Ltd.



**The excellent effects of the under-water lighting by the G.E.C. at the new bathing pool at Hastings can be gauged from this picture**

**Ebbw Vale.**—July 18th. Electricity Department. 300-kW glass bulb type mercury vapour rectifier. (July 7th.)

**Halifax.**—July 18th. Electrical work in connection with alterations to transport depôt. Mr. D. T. Lloyd Jones, borough engineer, Crossley Street. Deposit £1 1s.

**India.**—BOMBAY.—July 17th. Bombay, Baroda and Central India Railway Co. Electric lamps. (July 7th.)
SIMLA.—August 1st. Indian Stores Department. Two 75-kW motor-generator sets; 5-kW booster; switchboard. (A.V. 11881.)*

**London.**—ISLINGTON.—August 9th. Electricity Department. H.p. switchgear and other accessories. (June 30th.)
MILL HILL.—Electric lighting installation, St. Joseph's College.—F. R. Garrod.

**Portland.**—July 15th. Electricity Department. E.h.p. cable, truck type switchgear and meters. (June 30th.)

**Portuguese East Africa.**—LOURENCO MARQUES.—August 25th. Port and Railway Administration. Five floodlighting projectors (8,800 c.p. each). (A.Y. 11860.)*

**Rowley Regis.**—July 24th. Urban District Council. Electrical installation in 146 houses. (See this issue.)

**South Africa.**—CAPETOWN.—August 30th. Electricity Department. Oscillograph. &c. (A.Y. 11869.)*
JOHANNESBURG.—August 2nd. City Council. 10,000-kW steam turbo-alternator and condensing plant. (A.Y. 11876.)*

**Stockton-on-Tees.**—July 19th. Electricity Department. H.p. outdoor type switchgear and transformer kiosk. (July 7th.)

**Turkey.**—ISTANBUL.—August 16th. Department of Posts, Telegraphs and Telephones. Iron telegraph wire. (G.Y. 12748.)*
August 19th. 60 tons of copper wire and 5,000 copper sleeves. (G.Y. 12747.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

**Glasgow.**—Corporation Housing Committee. Accepted. Electrical installation at Scotstoun housing scheme (£2,549).—Darroch & Espie.
Electricity Committee. Accepted. Six transformers (£296).—Bruce Peebles & Co., Ltd.

**Herne Bay.**—Pier Committee. Accepted. Pier lighting works (£620).—Segmental Wire Corporation, Ltd.

**Lanarkshire.**—County Council. Accepted. Electric lighting at thirty-two houses at Blackwood (£162).—J. Harvie.

**Reigate.**—Town Council. Accepted. Wiring thirty houses at South Park (£4 5s. 6d. per house).—Reigate Electrical Co.

**Salford.**—Watch Committee. Recommended. Traffic signals.—Barber & Colman, Ltd.; Automatic Electric Co., Ltd.

**South Shields.**—Highways Committee. Accepted. Traffic signals in Prince Edward Road (£351).—Automatic Electric Co., Ltd.

**Wolverhampton.**—Electricity Committee. Accepted. Switchboard (£414), oil switches (£184), feeder units, &c., in connection with network rearrangement (£574).—Ferguson, Pailin, Ltd. Two 100-kVA transformers (£75 each).—Electric Construction Co., Ltd.

**Worthing.**—Electricity Committee. Recommended. Rectifying plant, &c., for Heene Road sub-station (£2,909).—English Electric Co., Ltd.

## Makers' Names Wanted

AGRO "Bakelite" lampholders.
GROSVENOR gramophone motors.
ALBION electric glue heater.
KEYSTONE vacuum cleaner.
FLEXIGLASS coloured switch cover.
KEEPCOOL electric fan.

# Notes

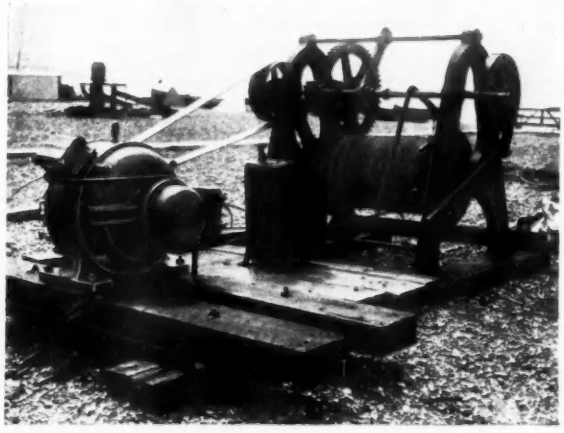
## Compensation for Displaced Employés

The text has been published of the Electricity (Supply) Bill introduced into the House of Commons by Mr. G. Hall with the support of members of all parties. A memorandum prefaced to the Bill states that, arising out of a claim for compensation under the provisions of Section 16 of the Electricity (Supply) Act, 1919, as amended by subsequent enactments, with respect to redundant officers and servants, the court has held that the time limit of five years during which a case for compensation must arise commences on the date when the improvement scheme, upon approval by Parliament, comes into force. The case which was before the court arose out of a scheme covering a large number of undertakings, and some redundant stations were not and could not be closed until after the expiration of five years. Consequently certain claims for compensation were rejected.

The sole purpose of the Bill is to provide that the time limit of five years shall date from the period when operations under a scheme with respect to a particular undertaking actually commence.

## Electric Winches on Brighton Beach

The three *Skylark* pleasure motor yachts at Brighton are now hauled up on the beach by electrical power. Each of the two winches is equipped with a 7½-h.p. motor, controlled by



**Electric haulage at Brighton**

an Allen West reversible type controller. The contractors for the fitting were Messrs. Hodgson & Potter, of Brighton. The load varies very considerably because the beach at low tide is an easy gradient, but when it approaches high water mark it shelves steeply, and naturally at this part greater power will be required. Re-launching is easy by the use of the reversing gear on the paraffin motors. It is intended to use belt transmission, but if this is unsatisfactory chain drive will be tried. The current will be at 400 V a.c. 3-phase conveyed by three-core armoured cable, passing under the beach. The switchgear is by the General Electric Co., Ltd.

## Institution Students' Contests

The London Students of Civil Engineering and the Graduates' Section of the Institution of Mechanical Engineers recently challenged the London Students' Section of the Institution of Electrical Engineers to meet them in cricket and tennis matches. The meeting took place on July 1st at Boston Manor. The "Electricals" proved successful in both events, winning the tennis by six matches to none, and the cricket by scoring 120 for eight wickets (dec.) (Joyce 53) against 89. Among those present were Sir Murdoch MacDonald, President Inst. C.E., Mr. L. St. L. Pendred, past-president Inst.Mech.E., and Mr. H. T. Young, member of the Council of the I.E.E.

## Ionospheric Investigation

At last Friday's meeting of the Physical Society in London Prof. E. V. Appleton described two wireless methods of measuring upper-atmospheric ionisation, both of which involve measurements of the equivalent height of reflection for a number of electric wave frequencies. Different relations exist between the equivalent height and the frequency for the ordinary and extraordinary magneto-ionic components. From the examples chosen to illustrate the methods the following deductions and measurements concerning ionospheric characteristics are made: (*a*) Magneto-ionic double refraction is caused by region *E*; this shows, as was previously demonstrated in the case of region *F*, that free electrons are the effective electrical agents. (*b*) For daytime conditions, and more frequently in summer than in winter, evidence of the existence of a protuberance or ledge on region *F* is found, which most probably indicates that under direct solar influence this region is sometimes composite. Evidence of the existence of ionisation between regions *E* and *F* ("intermediate region") has also occasionally been obtained at noon, so that the whole ionospheric configuration may be regarded as a composite structure of four components. From the point of view of practical radio communication, however, it is sufficient to regard the ionosphere as divisible into two main regions, *E* and *F*, but where it is necessary to consider further the ionospheric fine structure it is proposed to name the four components, at successive increasing equivalent heights, regions $E^1$, $E^{11}$, $F^1$, and $F^{11}$. Usually only regions $E^1$ and $F^1$ are of importance. (c) The rate of decay of region-*F* ionisation during the night has been measured and found not to be explicable in terms of the simple law of recombination between ions and electrons. (*d*) Measurements have been made of the rate of production of electrons in region *F* during the period following sunrise.

## The Diesel Engine Users' Association

The summer meeting of the Diesel Engine Users' Association will be held at Portsmouth on Saturday, July 22nd. Members desiring to participate in the meeting, luncheon and tea, should communicate immediately with the joint honorary secretaries, 307, Abbey House, Westminster, S.W.1. Special rail tickets to and from London have been arranged for and a limited number of guests may be invited.

## French Hydro-electric Development

Work is progressing on a series of eight new hydro-electric stations to utilise the power of the Santet falls on the river Drac. By means of a dam, an artificial lake with a storage capacity of 28,600 million gallons of water is being formed, and it is estimated that a total of 370,250 kW will be available, capable of producing 1,500 million kW per year. The first generating station is being erected at the foot of the dam, and will be equipped with six 13,250-kVA alternators. The power generated will be stepped up at an outdoor transforming station at first to 150,000 V, and later to 220,000 V, for transmission to the distribution network in the district.

## The Generation of Electricity During June

The official returns rendered to the Electricity Commissioners show that 885 million kWh of electricity was generated by authorised undertakers in Great Britain during June, as compared with the revised figure of 823 million kWh in the corresponding month of 1932, representing an increase of 62 million kWh, or 7.5 per cent. During the first six months of this year up to the end of June the total amount of electricity generated by authorised undertakers was 6,488 million kWh, as compared with the revised figure of 6,095 million kWh for the corresponding period of 1932, representing an increase of 393 million kWh, or 6.4 per cent.

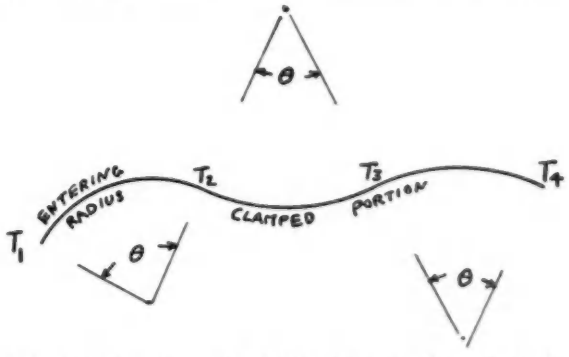
## Educational

The University College of Swansea provides courses in civil, mechanical, and electrical engineering and metallurgy, and entrance scholarships will be offered in April next.

A correspondence tuition scheme for engineers has been prepared by the Electrical Power Engineers' Association. Particulars and prospectus are obtainable from the general secretary, 102, St. George's Square, S.W. (See our classified advertisements.)

## Design of Conductor Clamps

The most common type of conductor strain clamp utilises the snake groove as a means of providing the necessary gripping force. The calculation of the slipping force of this type of clamp is a matter of trial and error. The clamp may be




designed to have a certain slipping force, or, alternatively, to break the conductor before it slips.

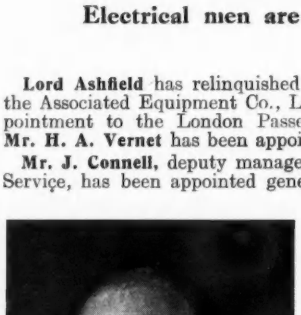
The application of the following formula in practice has given test results that are within a few pounds of the calculated figure:—$\mu$=coefficient of friction (1.51 for clamped grooves and 0.3 for the entering radius); $T_1$=slip load of the clamp; $T_2$=load at end of first radius; $T_2$ and $T_3$=load at end of second and third radius, etc.; $T_1-T_2$=load at end of first radius. Formula $\log \frac{T_1}{T_2} = .00758\ \mu\theta$; this result is termed x for convenience. Thus $T_2=\frac{T_1}{x}$; $\log \frac{T_2}{T_3} = .00758\ \mu\theta$; and $T_3=\frac{T_2}{x}$. This procedure is continued for the number of separate radii embodied in the clamp.

# Our Personal Column

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

**Lord Ashfield** has relinquished his position as chairman of the Associated Equipment Co., Ltd., consequent upon his appointment to the London Passenger Transport Board, and **Mr. H. A. Vernet** has been appointed to fill the vacancy.

**Mr. J. Connell,** deputy manager of British Wireless Marine Service, has been appointed general manager of the Marconi Sounding Device Co., Ltd. Mr. Connell has had wide experience in marine wireless work, since he joined the Marconi International Communication Co., Ltd., in 1907. After several years' experience at sea, he was appointed an inspector in the Liverpool area, where he rose to the position of inspector-in-charge of the company's depôt. In August, 1927, he was appointed managing director of the Companhiâ Nacional de Communicacoes sem Fio, an associated company of Marconi's, at Rio de Janeiro. On leaving Brazil in 1929, Mr. Connell was appointed to the British Wireless Marine Service.



**Mr. J. Connell**

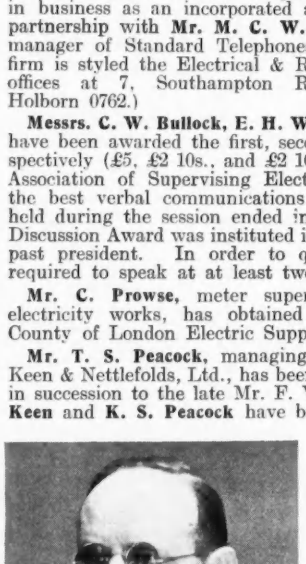
**Mr. S. Stansbridge,** hitherto assistant manager of the British Wireless Marine Service, has been appointed deputy manager.

**Mr. Bernard C. Holding,** until recently with the International Standard Electric Corporation in London, has started in business as an incorporated advertisement consultant, in partnership with **Mr. M. C. W. Thomas,** formerly publicity manager of Standard Telephones & Cables, Ltd. The new firm is styled the Electrical & Radio Publicity Service, with offices at 7, Southampton Row, W.C.1. (Telephone: Holborn 0762.)

**Messrs. C. W. Bullock, E. H. Whatton,** and **J. W. Hutchings** have been awarded the first, second and associates prizes respectively (£5, £2 10s., and £2 10s.) under the scheme of the Association of Supervising Electrical Engineers for making the best verbal communications in discussions at meetings held during the session ended in April, 1933. The Meetings Discussion Award was instituted in 1931 by Mr. S. B. Donkin, past president. In order to qualify each competitor was required to speak at at least two separate meetings.

**Mr. C. Prowse,** meter superintendent at Peterborough electricity works, has obtained an appointment with the County of London Electric Supply Co., Ltd.

**Mr. T. S. Peacock,** managing director of Messrs. Guest, Keen & Nettlefolds, Ltd., has been appointed deputy chairman in succession to the late Mr. F. W. Keen, and **Messrs. C. H. Keen** and **K. S. Peacock** have been elected to the board.



**Mr. Forbes Jackson**

**Mr. Forbes Jackson,** who for the past ten years has been with Messrs. Merz & McLellan, has been appointed Divisional Engineer (Electrical) to the London County Council in succession to Mr. C. A. Baker, who retired from that position in April last. Mr. Jackson received his early training with Messrs. Crompton & Co., of Chelmsford, and went from there to the British Thomson-Houston Co., Rugby, first on the test bed and later as an engineer in the Traction Department. He joined Messrs. Merz & McLellan in 1922, and has been engaged both in their London office and in India. In August, 1914, he entered the Navy, and after serving with the Royal Naval Divisional Engineers in Gallipoli was transferred to H.M.S. *Princess Royal* to take charge of the electrical equipment.

**Mr. Alex. D. Robb,** of the Canadian Niagara Power Co., has been elected president of the Canadian Electrical Association, and Messrs. John Morse (Shawinigan Water & Power Co.), R. B. Baxter (Calgary Power Co.), and E. H. Adams (B.C. Electric Railway Co.) have been elected vice-presidents.

**Mr. G. H. Nelson,** M.I.E.E., has been appointed chairman of the English Electric Co., Ltd. Mr. Nelson will retain his appointment as managing director.

**Mr. Henry S. Ingleby,** A.M.I.E.E., has resigned his position with Messrs. Scattergood & Johnson, Ltd., electrical and radio factors, Leeds. Correspondence should be addressed to him c/o Robson Eliff, 1, Albion Street, Leeds.

**Mr. A. C. G. Smith,** of Reading, has been appointed junior consumers' engineer in the Portsmouth electricity undertaking.

**Mr. E. S. Patterson,** electrical engineer, Peterhead, was married on June 14th to Miss Bessie Lovie, of Peterhead.

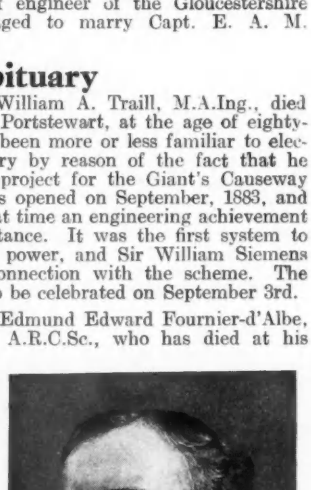
**Mr. W. W. Lackie,** who is a sectional engineer with the Central Electricity Board, and eldest son of Mr. W. W. Lackie, of Woodleigh, Weybridge, of the Electricity Commission, was married at Southbourne, Bournemouth, on June 24th, to Miss M. A. Ranger.

**Miss Beatrice Louise Ellis,** daughter of Mr. Harry Ellis, general manager and chief engineer of the Gloucestershire Power Co., Ltd., is engaged to marry Capt. E. A. M. Cleveland, M.C.

## Obituary

**Mr. W. A. Traill.**—Mr. William A. Traill, M.A.Ing., died on July 6th at Rockhaven, Portstewart, at the age of eighty-nine years. His name has been more or less familiar to electrical men for half-a-century by reason of the fact that he was the originator of the project for the Giant's Causeway electric tramway which was opened on September, 1883, and which was considered at that time an engineering achievement of no inconsiderable importance. It was the first system to make use of hydro-electric power, and Sir William Siemens gave his co-operation in connection with the scheme. The jubilee of the tramway is to be celebrated on September 3rd.

**Dr. E. Fournier-d'Albe.**—Edmund Edward Fournier-d'Albe, D.Sc. (Lond. and Birm.), A.R.C.Sc., who has died at his home at St. Albans, was an authority on the applications of light-sensitive cells, particularly selenium. Born in London in 1868, he was educated in Düsseldorf and at South Kensington. He was for some time assistant in the physical laboratories of the Royal College of Science for Ireland and Trinity College, Dublin, an assistant lecturer in physics at Birmingham from 1910-14, and special lecturer in physics at the Punjab University, Lahore, from 1914-15. In 1912 he invented the "Optophone," an instrument that translated the variations of a beam of light reflected from the printed page of an ordinary book or newspaper into musical notes, thus enabling blind people to "read" normal print. The value of the instrument was restricted by its cost, and it was Dr. d'Albe's constant endeavour, by cheapening his invention, to open up new possibilities for the blind. Four years ago a stroke deprived him of the use of an arm, which restricted his activities. He did useful work in connection with telephotography and television, and claimed to have transmitted the first picture sent from London in 1923. Some of his many publications have been translated into four languages.



*[Lafayette*

**The late Dr. E. Fournier-d'Albe**

**Mr. G. F. Cole.**—Mr. George F. Cole, general manager of the Electric Supply Co., of Victoria, Ltd., was fatally injured recently near his home at Bendigo in a motor car accident. Mr. Cole, who was fifty-one years of age, joined the company as an apprentice, and was appointed resident engineer in 1908, later becoming local manager. In 1930 he succeeded the late Mr. P. J. Pringle as general manager. He was largely responsible for the negotiations which led to the company's undertakings being acquired by the State Electricity Commission.

**Mr. W. Segrave.**—The death has occurred at his home near Melbourne of Mr. William Segrave, formerly representative in Australia of the Eastern Extension Cable Co., at the age of eighty-three. He was trained as an electrician under Latimer Clark, and joined the Imperial Telegraph Co. After holding several important positions, he went to Australia, where he took part in laying the Australian cables. He became director of the cable training station at Flinders.

**Mr. A. R. Fox.**—The death took place on July 4th of Mr. Arthur Reginald Fox, who was in business as an electrical engineer at Chippenham. He was formerly manager of the Chippenham Electricity Supply Co.

**Wills.—Mr. R. Foster,** M.I.E.E., of the Simplex Electric Co., Ltd., left £10,005 (net personalty £9,655).

Many will be the affectionate feelings, and tributes of admiration, to find expression among cable and other electrical men as they read the references to "Matthew Gray" and "Kaye Gray" in the will of **Miss Bethia Aitken Gray,** who presided for so many years over the home circle of the Grays of Silvertown, at Lessness Park. (The gross value of the estate was £87,173.) "The Matthew Gray Scholarship" at the University of Glasgow, for which £8,000 is set aside, will enable engineering students to undertake a year's travel "with a view to the study of the achievements of engineers from the earliest times to the present day." We hope that those who secure this scholarship from year to year will be animated with the spirit of daring enterprise for which the great Victorian cable-layer, after whom the bursary is named, was famous in his day. There are also two "Kaye Gray" bequests—one of £5,000 to the Royal Caledonian Schools, Bushey, to be used solely for the benefit of the children there, and a string of seventy-seven pearls to the Royal National Lifeboat Institution for the upkeep of a lifeboat off the West of Scotland. We hope that someone who knew him will pass it on to the schoolchildren of Bushey that Robert Kaye Gray was a great man of exceptional grace and courtesy. May we add, too, the belief that the gift of the proceeds of "a string of pearls" will come as one more proof to the brave men who watch around our coast, that all the Grays had a real regard for their interests—a regard based upon long experience of the dangers and perils of the deep when laying submarine telegraph cables in all oceans?

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Earl Manufacturing Co., Ltd.**—Private company. Registered July 3rd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless apparatus, electrical and mechanical contrivances and accessories, etc. The subscribers are: D. Welsh, Greywalls, Staines, Middlesex, accountant; C. W. P. Hotson, Elgin House, Colnbrook, Bucks. Secretary: Marjorie B. Lillywhite. Registered office: Avenue Works, Hanover Park, Peckham, S.E.15.

**G. A. Nicholas, Ltd.**—Private company. Registered July 3rd. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric, gas, and oil lamps, quartz lamps, fires, cookers, switchboards, control gear, fans, furnaces, irons, dynamos, &c. The directors are: G. A. Nicholas and Mrs. Lilian C. E. Nicholas, both of 2, Fairlawn Road, Lytham-St.-Anne's. Solicitors: James A. A. Taylor, 3, Fold Street, Bolton.

**Corlett Electrical Engineering Co. (1933), Ltd.**—Private company. Registered, July 3rd. Capital, £1,500 in £1 shares. Objects: To acquire the business of electrical engineers carried on by the Corlett Electrical Engineering Co., Ltd., at Wigan. The subscribers are: F. O. Southern, 44, Platt Lane, Hindley, Lancs; S. W. Mather, 781, Atherton Road, Hindley, Lancs; and H. H. Burrows, 51, Little Lane, Pemberton, Wigan. Solicitors: Arthur Smith & Broadie-Griffith, 24, King Street, Wigan.

**Keighley Fan & Motor Co., Ltd.**—Private company. Registered July 4th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electricians, electrical, mechanical, automobile and general engineers, manufacturers of and dealers in electricity and wireless telegraphy and other apparatus, &c. The first directors are: A. Blackburn, Croft House, Cross Roads, Keighley; W. Binns, "Wyngarth," Cross Roads, Keighley; N. H. Crosland, 16, Highfield Terrace, Cullingworth, Yorks. Registered office: Myrtle Engineering Works, Cross Roads, Keighley.

**Northern Electrical Co. (Grimsby), Ltd.**—Private company. Registered June 30th. Capital, £8,000 in £1 shares. Objects: To carry on the business of electrical, mechanical engineers, and general engineers, &c. The directors are: P. Watson, managing director, and Mrs. Maud M. Watson, both of "Clarendon," Abbey Park Road, Grimsby, and D. R. Davies, 8, Glebe Road, Cleethorpes, Lincs. Registered office: 117, Cleethorpes Road, Grimsby.

**Lindley Thompson Transformer & Service Co., Ltd.**—Private company. Registered July 7th. Capital, £6,000 in £1 shares (2,000 7 per cent. cumulative preference and 4,000 ordinary). Objects: To specialise in the designing and manufacture of static and other transformers, to deal in electric generators, dynamos, &c. The directors are: J. L. Thompson (managing director for life) and Mrs. F. A. Thompson, both of 8, North Park, Iver, Bucks. Secretary: M. A. Butt, 42, Claygate Road, Ealing, W.13.

**Ultra Switchgear Co., Ltd.**—Private company. Registered July 8th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, and manufacturers and workers of and dealers in electricity, motive power and light, &c. The permanent directors are: H. Dean (chairman), Kingscote, Bescot Road, Walsall; J. Hampton, The Laurels, Barr Common, near Walsall. Solicitors: Stockdale & Brown, Wednesbury and Tipton.

**Holt Electric Supplies Co., Ltd.**—Registered July 8th. Capital, £2,000 in £1 shares. Objects: To acquire the business of an electrical supplier carried on by Robert E. Holt at 29, New Brown Street, Manchester. The directors are: Robert E. Holt, Reginald E. Holt and Mrs. Violet Holt, all of "Rough Lea," Hill Top, Wilmslow.

**Mead Electric Co., Ltd.**—Private company. Registered July 8th. Capital, £2,000 in £1 shares. Objects: To carry on the business of dealers in electrical, radio engineering and aircraft supplies, &c. The directors are: A. G. Mead, 22, Newland Gardens, Ealing, W.13; W. Fletcher, 12, Winscombe Crescent, Ealing, W.5; G. F. Perry, "Oakleigh," Great West Road, Heston, Middlesex. Secretary: A. G. Mead. Registered office: 10, The Broadway, Ealing.

**Tanganyika Electric Supply Co., Ltd.**—Particulars filed June 28th pursuant to Section 344 of the Companies Act, 1929. The company was incorporated in Tanganyika Territory. British address: 66, Queen Street, E.C., where D. C. Brook is authorised to accept service of process and notices on behalf of the company. The directors are: J. V. Gray, Tanga, and J. R. Leslie and A. J. D. Small, both of Dar-es-Salaam (Board in Tanganyika); W. Shearer, Inglewood, Chislehurst, Kent; J. G. B. Stone, Muir House, Charlwood, Surrey; and C. L. Walsh, 125, Central Hill, Upper Norwood, S.E.19 (Local board in London).

**Dar-es-Salaam & District Electric Supply Co., Ltd.**—Particulars similar to those for the Tanganyika Co. above except that the Treasurer of Tanganyika Territory is also a director.

**Camille Espir, Ltd.**—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a manufacturer and importer of electrical accessories carried on by Mrs. L. Espir at 118/120, Great Tichfield Street, W. The subscribers are: Mrs. L. Espir and C. Espir, both of 14, Stanhope Road, Highgate, N.6. Solicitors: Hicks, Arnold & Bender, 25, Southampton Street, Strand, W.C.2.

**Thomas R. Hills, Ltd.**—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a wholesale distributor of electrical supplies carried on by T. R. Hills at Ashford, Kent. The directors are: T. R. Hills, The Lodge, 58, Albemarle Road, Willesborough, Ashford, Kent (managing director), and Basil A. Smith, Westfield, 29, Rodney Road, New Malden, Surrey (chairman). Secretary: C. J. C. Hills. Registered office: The Paddock, Station Road, Ashford, Kent.

**H. C. W. Elton, Ltd.**—Private company. Registered June 29th. Capital, £800 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, suppliers of electricity, manufacturers of and dealers in electrical, wireless and other apparatus, &c. The directors are: H. C. W. Elton and Mrs. Annie E. Elton, both of 13, Willows Avenue, Morden. Secretary: H. C. W. Elton. Registered office: 6, Lambeth Hill, E.C.

## Returns of Electrical Companies

**Pulford Bros., Ltd.**—Satisfaction (1) to the extent of £300 on December 10th, 1902, of debentures authorised October 18th, 1899, and registered September 30th, 1901, and (2) to the extent of £12,000 on June 20th, 1933, of mortgage dated March 17th, 1925, and registered April 6th, 1925. Notices filed June 26th, 1933. (According to the register of mortgages, the debentures registered September 30th, 1901, originally secured £1,000). Three mortgages dated June 20th, to secure £2,000, £8,500 and £1,500 respectively, charged on 102/104, Whitechapel, Liverpool. Holders: Sir Charles H. Morton, Kt., 5, Cook Street, Liverpool, and others.

**Whitstable Electric Co., Ltd.**—Satisfaction in full on April 30th, 1932, of debentures authorised by resolutions of September 3rd, 1925, and October 16th, 1925, and registered October 31st, 1925, securing £30,000. (Notice filed June 28th, 1933.) Issues on various dates from November 1st, 1925, to April 4th, 1928, of £29,990 debentures, parts of a series already registered. (Particulars of issues filed June 28th, 1933.)

**All-Electric House Co., Ltd.**—Satisfaction in full on June 9th, of memorandum of deposit dated October 17th, 1932, and registered November 5th, 1932. (According to the register of mortgages, the letter of deposit registered November 5th, 1932, originally secured all moneys due to bank.)

**Lithanode Co., Ltd.**—Issue on June 21st, of £1,300 debentures, part of a series already registered.

**Mather & Platt, Ltd.**—Capital, £2,500,000 in 40,000 preference shares of £10 and 1,460,000 ordinary and 640,000 unclassified shares of £1. Return dated March 14th, 1933. 40,000 preference and 1,363,660 ordinary shares taken up. £630,660 paid on 29,200 preference and 338,660 ordinary shares. £1,133,000 considered as paid on 10,800 preference and 1,025,000 ordinary shares. Mortgages and charges, nil.

**John Richards & Co. (Longton), Ltd.**—Particulars filed of £1,000 debentures authorised June 20th, 1933, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £500.

**E. P. Allam & Co., Ltd.**—Capital, £6,000 in £1 shares. Return dated April 19th, 1933. 5,000 shares taken up. £2 paid, £4,998 considered as paid. Mortgages and charges, nil.

**Pasco (Liverpool), Ltd.**—Capital, £400 in £1 shares. Return dated December 31st, 1932 (filed April 27th, 1933). All shares taken up. £400 paid. Mortgages and charges, nil.

**Wellingborough Electric Supply Co., Ltd.**—Capital, £50,000 in £10 shares. Return dated April 25th, 1933. All shares taken up. £50,000 paid. Mortgages and charges, £37,000.

**Northampton Electric Light & Power Co., Ltd.**—Capital, £1,000,000 in 75,000 preference and 925,000 ordinary shares of £1. Return dated March 15th, 1933. 52,500 preference and 725,000 ordinary shares taken up. £777,500 paid. Mortgages and charges, £463,000.

**Electrical Distribution of Yorkshire, Ltd.**—Capital, £1,900,000 in £400,000 6 per cent. cumulative preference stock and £1,500,000 ordinary stock. Return dated March 21st, 1933. All stock taken up. £1,900,000 paid. Mortgages and charges, nil.

**Pennocks Patents, Ltd.**—Satisfaction to the extent of £50 on June 20th, 1933, of debenture dated December 30th, 1931, and registered December 31st, 1931.

**A. F. M. Electrical Service, Ltd.**—F. W. Miller, 187, Melrose Avenue, Cricklewood, N.W., ceased to act as receiver and/or manager on June 14th, 1933.

**J. & S. Farr, Ltd.**—Mortgages dated September 30th, 1913, charged on property in Nottingham (property acquired November 30th, 1921) on which £3,000 was owing on November 1st, 1929. (Now registered pursuant to Section 91 of the Companies Act, 1929.) Mortgagees: Home Brewery Company, Ltd., Daybrook, Notts.

**Yorkshire (West Riding) Electric Tramways Co., Ltd.**—Mortgage dated June 22nd, 1933, to secure not more than £1,760, charged on land with club house, &c., thereon in Wakefield. Holders: Wakefield Building Society.

**W. E. Dove & Co., Ltd.**—Capital, £3,500 in £10 shares. Return dated March 13th, 1933. 320 shares taken up. £2,000 paid. £1,200 considered as paid. Mortgages and charges, £800.

**Lang Electrical Co., Ltd.**—Capital, £100 in £1 shares. Return dated December 31st, 1932 (filed May 2nd, 1933). 51 shares taken up. £51 paid. Mortgages and charges, nil.

**Seaton and District Electric Light Co., Ltd.**—Capital, £10,000 in £1 shares. Return dated March 25th, 1933. All shares taken up. £10,000 paid. Mortgages and charges, £4,800.

**Epoch Radio Manufacturing Co., Ltd.**—Capital, £500 in £1 shares. Return dated December 31st, 1932 (filed March 1st, 1933). Forty shares taken up. £40 paid. Mortgages and charges: £300.

**British General Radio Co., Ltd.**—Capital, £3,000 in 2,000 preference shares of £1 and 4,000 ordinary shares of 5s. each. Return dated February 18th, 1933. Two preference and 4,000 ordinary shares taken up. £2 paid, £1,000 considered as paid. Mortgages and charges: £600.

**Wood & Co. (Ipswich), Ltd.**—Particulars filed of £300 debentures authorised June 1, 1933, charged on the company's undertaking and property, the amount of the present issue being £150.

J. B. Sanderson, 5 Arcade Street, Ipswich, was appointed receiver and manager on June 15th, under powers contained in debenture dated May 5th, 1933.

**Mek-Elek Engineering, Ltd.**—Capital, £2,000 in £1 shares. Return dated December 31st, 1932 (filed March 22nd, 1933). 502 shares taken up. £502 paid. Mortgages and charges, nil.

**McEwan & Co. (Brighton), Ltd.**—Capital, £500 in £1 shares. Return dated January 13th, 1933. All shares taken up. £450 paid. £50 considered as paid. Mortgages and charges, £2,500.

**Sentry Dry Battery Co., Ltd.**—S. F. Homewood, 1, Queen Victoria Street, E.C.4, was appointed receiver and manager on June 14th, 1933, under powers contained in debenture dated September 19th, 1932.

**Mouldings, Ltd.**—F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham, was appointed receiver on June 17th, under powers contained in debenture dated June 10th, 1932.

**Engineering Works (Electrical and General), Ltd.**—The nominal capital has been increased by the addition of £7,000 beyond the registered capital of £3,000. The additional capital is divided into 7,000 7½ per cent. preference shares of £1 each.

**Viking Sales, Ltd.**—Issues on June 15th, 1933, of a second debenture for £100, and on same date of a debenture for £1,000, parts of series already registered.

**Stokes Appliances, Ltd.**—Capital, £5,000 in £1 shares. Return dated December 31st, 1932 (filed February 27th, 1933). 401 shares taken up. £401 paid. Mortgages and charges, nil.

**Alton District Electricity Co., Ltd.**—Capital, £25,000 in £1 shares. Return dated March 16th, 1933. 5,000 shares taken up. £5,000 paid. Mortgages and charges, nil.

**D. R. & L. R. Williams (Electrical Contractors), Ltd.**—L. S. Findlay, 35, Windsor Place, Cardiff, was appointed receiver on June 16th, under powers contained in debentures dated October 13th, 1932.

**Electric Products, Ltd.**—Capital, £100 in £1 shares. Return dated December 5th, 1932 (filed March 14th, 1933). All shares issued. £2 paid. Nil called up on 98 shares. Mortgages and charges, nil.

**Supra Electra Motors, Ltd.**—Issue on June 22nd of £200 debentures, part of a series already registered.

**William Maxwell & Co., Ltd.**—Debenture dated June 14th to secure £2,000, charged on the company's property, present and future, including uncalled capital. Holder: S. T. Hurley, Briar Lodge, Askew Road, W.12.

**Harts Wireless Supplies, Ltd.**—Particulars filed of £2,000 debentures authorised June 14th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,750.

**Grafton Radio, Ltd.**—Particulars filed of debentures to secure not more than £3,000, authorised June 22nd, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £3,000.

**Southern Counties Radio, Ltd.**—G. Steven, "Kenwyn," Furse Lane, Purley, ceased to act as receiver and manager on May 31st, 1933.

# City Notes

**W. T. Henley's Telegraph Works Co., Ltd.,** held its annual meeting on July 7th. Sir Montague Hughman (chairman) presiding. At the opening of the meeting Sir George Sutton (president) paid a tribute to Mr. Salmon, the late chairman, and Messrs. Hatton and Potter (directors) who had died since the last meeting. In presenting the report and accounts (ELECTRICAL REVIEW, June 30th, p. 961), the chairman said that they still had a considerable sum of money in Australia, which, however, was earning a higher rate of bank interest than could be obtained in this country. The fall in the value of money had had an adverse effect on the return from their investments, and this had been the main cause of the small reduction in their net profits. Business abroad had been restricted, owing to the difficulties of exchange and the general depression, although signs of a revival were becoming apparent. On the other hand, their business at home had shown a substantial increase. They had had a difficult year, and competition had been keen, resulting in a reduced rate of profit on their turnover. They had, however, been able to give employment to a larger number of workpeople. During the past year the selling prices of underground cables had been lower than they had ever been in the history of the industry. It was interesting to note that when the prices of commodities used in their business were at their highest they were at their busiest. An ample supply of additional electrical power from the grid scheme would shortly be available; the electricity supply authorities were alive to the fact that the time was favourable to increase their underground distribution networks, and they might expect to get a fair share of this increase. Last year the chairman reported that for the three months ended June 30th, 1932, the orders received showed a value slightly in excess of those received for the corresponding period in 1931. Orders received for this period in 1933 showed an advance over those of 1932. A new building at North Woolwich had been completed, and this extension had relieved the congestion experienced in various departments. The profits of their subsidiary, Henley's Tyre & Rubber Co., Ltd., showed a reduction compared with the previous year, but the company continued to do a large business. Although there had been a falling-off in the turnover, the output showed an increase. The Research Department formed by Sir George Sutton immediately after the war had completely justified Sir George's action. It had grown considerably since its inception, and to-day was an important factor in the successful operations of the company. The welfare of their employés received their constant attention and the funds for the male staff pension scheme and the deferred pay scheme for the ladies amounted now to nearly £450,000. With regard to the future, owing to present conditions, it was impossible to give any reliable forecast of what the coming year held for them. The World Economic Conference was in session, and representatives of the various governments were endeavouring to restore trade to prosperous conditions. If the Conference failed to come to agreement then the outlook was uncertain, and even if it agreed on a policy, only time could tell whether this would prove effective. A levelling of tariff walls all round could not fail to have a beneficial effect on international trade. Whatever the result might be, their company's financial position was strong and unimpaired after four years of world-wide trade depression and unemployment. They were financially, technically and commercially ready to take full advantage of any improvement in trade, and to fight any form of competition.

Mr. W. F. Bishop, in seconding the resolution for the adoption of the report and accounts, said that notwithstanding the very low commodity prices their turnover in value showed an increase on last year. This was partly due to a small increase in the volume handled by their works and partly to an increased volume of work carried out by their Contract Department, particularly in connection with contracts for the Central Electricity Board, for whom they had almost completed nearly 350 miles of 33,000-V and 132,000-V overhead transmission lines, and over 150 miles of underground cable, including many miles of 66,000-V cable. They had secured a fair share of overseas business, and had maintained their selling organisations in practically every country in the world in a state of high efficiency, ready to take advantage of any increased business which improved world conditions might make possible. A further Henley straight-through lead press had been installed at their Gravesend works, and they were now erecting one at their Woolwich works.

**The Underground Electric Railways Co. of London, Ltd.,** has issued its scheme for the liquidation and distribution of its assets in accordance with the London Passenger Transport Act. Holders of the £6,750,000 five per cent. first debenture stock will exchange each £100 of their stock for a similar amount of London Transport five per cent. "B" stock, while holders of the £1,273,000 of six per cent. first cumulative income debenture stock will receive £60 of Transport five per cent. "B" stock, £55 of Transport "C" stock, and 10s., less tax, in cash for each £100 of existing stock. Ordinary shareholders (£10,700,990) will receive £117 of Transport "C" stock for every £100 held, and one ordinary share of the North Metropolitan Electric Power Supply Co. for every twenty-two Underground shares, while the balance of 535,050 shares of that company will be offered at the rate of five shares for every £100 of Underground shares at 42s. 6d. per share (free of stamp duty). In addition the 150,000 £10 shares held by the Underground Co. in the Associated Equipment Co. are to be sub-divided into £1 shares and distributed among ordinary shareholders in the proportion of two £1 shares for every fifteen Underground shares held, and a sum in cash, the amount of which is not yet ascertainable.

**Greenwood & Batley, Ltd.,** held their annual meeting on July 7th. Col. H. A. Micklem (chairman), who presided, said that exchange restrictions, tariffs, quotas, &c., were intensified during the past year. Russia was one of the few countries from which orders during the past year showed a healthy expansion; it was therefore a relief to know that the trade embargo had been removed. They considered the preservation and development of that market as most valuable. Regarding the home trade, orders had not been plentiful; competition was

keen and prices were correspondingly low, but they had obtained their fair share of the business available. They had received orders for a number of electric locomotives and trucks, while they had developed a new design of multi-stage turbine which had enabled them to obtain orders for turbine dynamos for one of His Majesty's ships. They had also been successful in obtaining orders for their new type of small power turbines for direct coupling. During the year they purchased the goodwill, drawings and patterns of Messrs. John Hands & Sons, Ltd., and of Messrs. Hollings & Guest, Ltd. These assets had added to the strength of their hydraulic and machine tool departments and had resulted in some satisfactory orders.

**The Dubilier Condenser Co. (1925), Ltd.,** reports a profit for the year ended March 28th last of £13,539, as compared with a loss of £12,193 for 1931-32. Of this £6.464 is reserved for depreciation, and the balance is deducted from the loss brought in, leaving a debit balance of £74,770 to be carried forward. At the meeting to be held on August 1st proposals will be submitted for reorganising the capital of the company. It is proposed to reduce the capital from £500,000 to £238,187 10s. by writing down the 200,000 issued £1 preference shares to 13s. each, and the 426,250 issued 10s. ordinary shares to 1s. each. The reduced preference shares are to be sub-divided into one 10 per cent. non-cumulative preference 10s. share and three ordinary 1s. shares. Arrears of dividend on the preference shares are to be cancelled. Consequent upon the reduction of the capital the book value of land, plant, &c., will be reduced, patents, trade mark and goodwill, and the balance of preliminary expenses will be written off, the book figure of investments in subsidiaries will be reduced to their present value, and the debit balance at profit and loss account will be extinguished.

**Petters, Ltd.,** report a net loss for the year ended March 31st last of £23,381, as compared with a profit of £13,136 in the preceding year. This is deducted from a credit balance of £44,589 brought in, leaving £21,209 available. It is proposed to pay the interest on the funding certificates (£1,260), and to carry forward the balance of £19,948. The report states that the depression in export trade continued during the year with increasing intensity, while losses due to political and financial difficulties in many countries had fallen upon the company, although not to the same extent as in the previous year. Drastic economies had enabled a small trading profit to be maintained, while the financial position of the company has been strengthened. The aircraft works are still suffering from a shortage of orders. Meeting: July 18th.

**Urban Electric Supply Co., Ltd.**—Edmundson's Electricity Corporation, Ltd., has made an offer to acquire the company's publicly held shares, the terms being six £1 ordinary shares of Edmundson's for five Urban ordinary shares or 39s. 6d. per share in cash. The Corporation already owns over two-thirds of the ordinary and about one-third of the preference capital of the Urban Co. The Greater London and Counties Trust will provide out of its existing shareholding any Edmundson's ordinary shares required for transfer to Urban ordinary shareholders and will resell at 39s. 6d. per share to Edmundson's the Urban ordinary shares exchanged. Thus no immediate increase will be necessitated in the ordinary share capital of Edmundson's. The offer will remain open until July 20th, and the directors of the Urban Electric Supply Co. recommend its acceptance.

**Edmundson's Electricity Corporation, Ltd.,** reports that during June the electrical energy generated and purchased totalled 33,029,000 kWh, as compared with 27,712,000 kWh in the corresponding month of 1932, an increase of 19 per cent. The total for the first half of the current year was 225,759,000 kWh as against 191,362,000 kWh for the first six months of 1932, an increase of 18 per cent.

**The Lisbon Electric Tramways, Ltd.**—Presiding at the annual meeting on July 5th, Lt.-Col. V. Vivian said that the world-wide economic depression that existed when they last met had not yet come to an end, and consequently some falling-off in traffic receipts was again shown. The number of passengers carried was 118,725,708, a decrease of 2,867,144 as compared with the preceding year. Although unemployment in Portugal was not on a large scale, it was sufficient to affect the number of passengers carried on the trams. In the past two years they had suffered a diminution of traffic receipts, but there were indications that the decrease was coming to an end, and a slight, though significant, upward movement had lately developed.

**The Palestine Electric Corporation, Ltd.,** in its report for 1932, states that notwithstanding the considerable reductions which were made in the charges for electricity as from January 1st, 1932, the gross revenue increased from £P.139,673 to £P.145,512. The gross profit, including £P.4,328 brought in, was £P.87,831, and after providing for depreciation, debenture interest, and a preference dividend of 8 per cent., £P.27,853 is carried forward. It is proposed to capitalise £P.79,486, part of £P.80,991 surplus realised on the liquidation of the Jaffa Electric Co., by the distribution of fully-paid ordinary shares among ordinary shareholders in the proportion of one share for every ten held. The sales of electricity increased by 2,882,433 kWh to 11,590,350 kWh, and the number of consumers by 3,084 to 15,113.

**The Victoria Falls & Transvaal Power Co., Ltd.,** reports a net profit for 1932 of £400,910, as compared with £385,008 in the preceding year, which with £224,315 brought in makes £624,525 available. The reserve again receives £50,000 and the ordinary dividend is maintained at 15 per cent., plus a bonus of 5 per cent. from the credit balance arising out of exchange during the year. The amount carried forward is £276,764. Meeting: July 27th.

**The Anglo-Argentine Tramways Co., Ltd.**—Presiding at the annual meeting on July 11th, the Duke of Atholl (chairman) said that the accounts reflected a situation worse than twelve months ago. During 1932, in common with nearly all public utility undertakings in Argentina, they had shared the consequences of increased economic depression, which had accounted for about one-quarter of the year's loss in traffic compared with 1931. A further loss was due to the extension of the Lacroze subway, but the greatest factor had been the continuous development of competition from motor vehicles. They estimated that the omnibus and taxibus services were responsible for absorbing at the rate of 100,000,000 annually passengers formerly carried by their company, which meant in receipts a yearly loss of £650,000. A scheme of transport co-ordination had been placed before the special mission of representatives of the Argentine Government during its visit to this country, and it had sympathetically received the company's case. They were hopeful that its prompt handling, assisted by a helpful attitude on the part of the Municipality of Buenos Aires, would be assured under the terms of the convention with Great Britain that resulted from the mission's visit.

**Davey Paxman & Co. (Colchester), Ltd.**—This company was incorporated in August, 1932, to acquire the business and assets from the receiver and manager of Davey Paxman & Co., Ltd. (in liquidation) as from the date of his appointment (February, 1932). The report for the period February 26th, 1932, to March 31st last, states that after making provision for income tax, depreciation on fixed plant and machinery, &c., debenture interest and directors' fees, the accounts show a profit of £1,002, which is utilised to write down preliminary expenses.

**The Montreal Tramways Co.** has declared a dividend for the quarter ended June 30th of $2.60 per share on the common shares.

**The Southern Areas Electric Corporation, Ltd.,** is offering existing shareholders 51,000 ordinary shares at 23s. per share, in the proportion of three new shares for every ten held.

**The Great Northern Telegraph Co.'s Holding Co., Ltd.,** proposes to distribute for the financial year ended June 30th a total dividend of 22 per cent., to set aside Kr. 304,000 for taxes, and to carry forward Kr. 12,772.

**The Para Telephone Co., Ltd.,** reports a net profit for 1932 of £7,332, as compared with £3,460 in the preceding year. To this is added £1,152 brought in, and after placing £3,801 to depreciation, etc., it is proposed to pay a final dividend of 3 per cent., making 5 per cent. for the year (against 3 per cent.), and to carry forward £1,182.

**The Telefon Aktiebolag L.M. Ericsson** (Swedish Ericsson Co.) reports net profits of 77,788 kr. for 1932. This amount reduces the loss from 1931 to 9,984,005 kr.

**The United Dominions Trust (Electric), Ltd.,** according to the report of its parent company, the United Dominions Trust, Ltd., has paid to the latter a dividend at the rate of 10 per cent., less tax. The subsidiary company carries forward an undistributed profit of £3,215, and in addition a deferred income account of £6,727 has been built up. The capital has been increased from £50,000 to £100,000 during the year.

**The Yorkshire Electric Power Co.** has announced an interim dividend of 3 per cent. on the ordinary shares (same).

**The Electrical Distribution of Yorkshire, Ltd.,** is maintaining the interim dividend on the ordinary shares at 4½ per cent.

## Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets have become the centre of a keen demand for stocks and shares in British companies on behalf of American purchasers. It would seem that almost every week words such as "extraordinary," "amazing," and "unique," have to be employed in a recital which, for years past, has been kept within the bounds of staid and sober description. The "extraordinary" event during the past few business days has been the fall in the value of the dollar—a fall which has proceeded to an extent that, until just lately, would have appeared impossible. The Americans themselves have taken fright at the way in which their currency has depreciated, and, turning dollars into sterling, are buying lines of whatever British industrial stocks and shares they can obtain.

The result of this can be seen in the list of prices of shares in manufacturing companies, where, however, the nominal quotations fail to represent the full extent of the animation which is now prevailing. The activity would be even more marked than it is, if there were enough shares to satisfy the demand from both sides of the Atlantic. Our own people have been following the upward movement with keen interest and with supplies of capital largely drawn from realisation of gilt-edged securities. Prices of the latter have gone back sharply. At the other end of the scale which has raised industrials to their present height is the corresponding fall in British Government and similar stocks. To such an extent did the industrial boomlet reach, that it became over-extended, and a general reaction occurred on the first two days in this week.

### Home Electricity Supply

The changes in the list of shares in home electricity companies are mostly confined to improvements in the provincial and Scottish group. Up to the present no indication has appeared of anxiety to sell on the part of the holders of the best-class London companies' shares. County of London ordinary are ⅛ up at 53s. 9d., these being old favourites of the group that was closely associated with American interests. Urban ordinary have advanced to 38s. 9d. upon an offer by Edmundson's Electricity Corporation for an exchange of its shares against those of the Urban Electric Supply Company. Edmundson's 6 per cent. preference shares stand at 27s., and Urban preference are quoted at 29s. It will be remembered that the principal shareholder in Edmundson's is the Greater London & Counties Trust.

### London Passenger Transport

The handing over of the control of London's transport from private enterprise to the London Passenger Transport Board,

has duly taken place, although it will be a week or two before the final arrangements are through. The first step was taken, so far as the Stock Exchange part of it was concerned, on Monday in this week, when the quotations of nearly four dozen securities connected with the Underground and tramway systems were removed from the pages of the Stock Exchange Official List, their places being taken by the five new securities that came into being. There is a sixth, as already mentioned, the Local Authorities' stock, but this cannot be dealt with, save with the consent of the Board, until 1944, and it is not likely therefore, to appear in the lists for some time to come. The shares of the Underground Electric Railways still remain, as do the assented stocks of the Central London Railway, but District ordinary, it will be noticed, is taken out of our price lists. Metropolitan consolidated assented stock will continue as before, the price this week being a point lower at 72.

## The New Transport Board Stocks

The quotations for the new London Passenger Transport stock are in accordance with those already forecast on previous occasions. The chief interest centres round the Authority's "C" stock, for the reason that no one can tell at present what dividend is likely to be paid on this issue. So many stocks and shares go to make up the security at the back of it that, until the first year's working results become available, it is difficult to do more than vaguely estimate the dividend which the holders may expect to receive. In advance, the range of prophecy lies between 3 per cent. and 5 per cent. Taking the middle rate as a basis of calculation, a 4 per cent. dividend on the stock would give a return of 5¼ per cent. Business is being done in the stocks, but, as dealers in the market point out, to take away 45 securities from their lists, and, in the place, put only five others, causes a serious diminution of business that they, the jobbers, were able to count upon in the ordinary way.

The preference shares of the London & Suburban Traction Company, and the debenture stock of the London United Tramways, continue in the lists, but they will disappear in due course.

## Victoria Falls

Victoria Falls ordinary shares have had a sharp rise, touching 92s. 6d., before the price reacted to 91s. 3d. ex dividend and bonus, the latter showing a net gain on the week of 5s. 6d., and making 7s. 9d. within the past fortnight. The buying continues to be based upon the bonus of 5 per cent. declared in addition to the regular 15 per cent. dividend on the ordinary shares. The preference stand at 40s. 3d. ex dividend, at which it may be suggested that the quotation is sufficiently high, bearing in mind the option which the company possesses of ultimately repaying these preference shares at 20s.

## Cables and Wireless

In the feverish demand for industrials which characterised the first part of the month, Cables & Wireless came in for their due share of attention. Following upon the rises secured last week, the three classes of stocks further improved, the preference to 80½, the "A" ordinary to 29½. Higher prices have been quoted, but in the reaction that took place early this week the top prices were not held. Globe ordinary have risen to £12, tying with the preference. Great Northerns at 31½ are 10s. higher. Further improvements in Anglo-American Telegraphs lifted the preferred to 107½, the deferred to 25, both stocks showing a gain of 1. Telegraph Condenser shares, which were introduced to the market in the earlier part of the month on the basis of 21s. 3d., have eased off to 20s. 6d. American Telephone and Telegraph have receded to 140, showing a drop of 7½ points. International Telephone and Telegraphs at 20½ are 1½ down.

## Manufacturing and Equipment

The general rise in prices in this market which occurred earlier in the month has been held in the majority of cases; and in certain of them, additional rises have occurred. The principal improvement is a gain of 3s. in British Aluminium ordinary, the price advancing to 31s. 3d. Associated Electrical Industries, after their gain of 3s. 3d. last week, are unchanged at 20s. 9d. Ever-Ready shares came in for a good deal of attention, and hardened to 29s. 3d., showing a gain of 1/6 on the week. General Electric ordinary at 45s. have recovered deduction of the dividend, and Henleys at 6¼, allowing for the dividend, are 1/8 to the good. Siemens ordinary at 25s. are similarly better. Enfields gained ½, improving to 4 9/16. Telephone Properties at 20s., Telegraph Constructions at 18s. 9d., and Telephone Rentals at 6s. 7½d. have all moved up.

## Miscellaneous Matters

Atlas ordinary have rallied from the first effect of the disappointing report; the price at 10s. is 3s. up. The preference recovered to 21s. 3d. British Power and Light are steady at 17s. Aron Electricity Meter ordinary at 43s. 6d. are 3s. 6d. better, on the return of the shares to the dividend-paying list after an interval of five years. Anglo-Argentine Tramways shares present the anomaly of the first preference standing 6d. higher than the seconds. Tokyo Electric sixes at 84 are 2 points higher on the week. Iron and Steel shares have been in request, but reaction overtook an earlier rise. Babcocks at 1½ are a few pence to the good. Vickers rose to 7s. 9d. and reverted to 7s. 3d. The rubber share market has been strong; sellers came in, however, on the rise and the market relapsed into quietude.

# Share List of Electrical Companies

### HOME ELECTRICITY COMPANIES.

| | Nom. | Approx. Dividend. 1931. | 1932. | Price, July 11. | Rise or Fall. | Yield. p.c. £ s. d. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole | 1 | 15 | 15 | 73/3 | —1/6 | 4 1 9 |
| Brompton Ordinary | 1 | 8½ | 7 | 32/6 | — | 4 6 2 |
| Central Electricity 4½% Deb. | Stock | 4½ | 4½ | 105 | — | 4 5 9 |
| Charing Cross Ordinary | 1 | 8d | 7 | 33/0 | — | 4 4 10 |
| Chelsea | 1 | 8½ | 7 | 32/– | — | 4 7 6 |
| City of London | 1 | 10 | 10 | 33/6 | — | 4 3 7 |
| Clyde Valley | 1 | 7 | 7 | 36/3 | +1/6 | 3 17 3 |
| County of London | 1 | 10½ | 10½ | 53/9 | +1/6 | 3 18 1 |
| Edmundson's 7% Pref. | 1 | 7 | 7 | 30/–xd. | — | 4 13 4 |
| Elec. Dis. Yorkshire | 1 | 9 | 9 | 43/9 | +6d. | 4 2 4 |
| Elec. Supply Corporation | 1 | 11 | 11 | 66/3 | +1/9 | 3 6 8 |
| Kensington Ordinary | 1 | 8 | 7 | 32/6xd. | — | 4 6 2 |
| Lancs Light and Power | 1 | 7 | 7 | 31/3 | — | 4 9 7 |
| London & Home Counties 4½%Deb. | Stock | 4½ | 4½ | 107xd | — | 4 4 1 |
| London Electric | 1 | 9 | 7 | 32/6 | — | 4 6 2 |
| Metropolitan | 1 | 10 | 10 | 49/6 | — | 4 1 0 |
| Midland Counties | 1 | 7 | 7 | 37/6 | +1/6 | 3 14 8 |
| Mid. Elec. Power | 1 | 8 | 8 | 38/9 | +1/6 | 4 2 4 |
| North Eastern Electric Ordinary | 1 | 6 | 6 | 30/– | — | 4 0 0 |
| Do. 7% Pref. | 1 | 7 | 7 | 32/6 | +6d. | 4 6 2 |
| Northampton | 1 | 10 | 10 | 50/– | — | 4 0 0 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 13xd. | — | 4 12 4 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 28/6 | — | 4 4 3 |
| St. James' and Pall Mall | 1 | 8 | 7 | 31/6xd. | — | 4 9 0 |
| Scottish Power | 1 | 8 | 8 | 36/3 | — | 4 8 2 |
| South London | 1 | 8½ | 7 | 33/– | — | 4 4 10 |
| Urban Ordinary | 1 | 7 | 7 | 38/9 | +1/6 | 3 12 2 |
| Westminster Ordinary | 1 | 8½ | 7 | 32/– | — | 4 7 6 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 20/9 | — | 7 4 7 |
| Yorkshire Elec. | 1 | 8 | 8 | 42/6 | — | 3 15 3 |

### HOME RAILS.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented | Stock | 4 | 4 | 90 | — | 4 9 0 |
| Metropolitan | ,, | 2½ | 1½ | 72 | —1 | 2 5 1 |
| Underground Electric | 1 | 7 | 4½ | 23/6 | +6d. | 3 16 7 |

### TELEGRAPH AND TELEPHONES.

| | | | | | | |
|---|---|---|---|---|---|---|
| American Tel. & Tel. | $100 | 9 | 9 | 140 | —7½ | 6 8 8 |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 107½ | +1 | 5 11 8 |
| Do. Def. | ,, | 1½ | 1½ | 25 | +1 | 6 0 0 |
| Cables & Wireless 5½% Pref. | ,, | 2¾ | 2¾ | 80½ | +2 | 3 8 4 |
| Do. A 7½% Ord. | ,, | Nil | Nil | 29½ | +2 | — |
| Do. B. Ord. | ,, | Nil | Nil | 13 | +½ | — |
| Globe Tel. and T. Ord. | 10 | Nil | 2½ | 12 | +¾ | 2 4 5 |
| Do. do. Pre. | 10 | 6 | 6 | 12 | — | 5 0 0 |
| Great Northern Tel. | 10 | 20 | 20 | 31½ | +½ | 6 7 0 |
| Marconi-Marine | 1 | 10 | 7½ | 31/3 | — | 4 16 0 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 2¾ | — | *4 3 6 |

### HOME AND FOREIGN TRAMS, ETC.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. | 5 | Nil | Nil | 5/9 | –6d. | — |
| Do. do. 2nd Pref. | 5 | Nil | Nil | 6/3 | — | — |
| Do. do. 5% Deb. | Stock | Nil | Nil | 14½ | — | — |
| British Electric Traction Df. Ord. | ,, | 5 | 5 | 410 | +10 | — |
| Do. do. Pref. Ord. | ,, | 8 | 8 | 135 | — | 5 18 5 |
| Brazil Traction | 100 | — | — | 16½ | —1½ | — |
| Brit. Columbia Elec. Rly. Pce. | Stock | 5 | 5 | 102½ | — | 4 19 6 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 19/6 | +6d. | — |
| London United Tram Deb. | Stock | 4 | 4 | 72½ | — | 5 10 4 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 36½ | —2 | 13 14 0 |
| Mexican Light Common | 100 | Nil | Nil | 15½ | +1 | — |
| Do. 7% Pref | 100 | 7 | 7 | 15 | — | — |
| Do. 1st Bonds | — | 5 | 5 | 70½ | — | 7 1 10 |
| Victoria Falls Ord. | 1 | 15 | 20 | 91/3xd. | +5/6 | 4 7 7 |
| Yorkshire (West Riding) | 1 | Nil | Nil | 10/– | — | — |

### MANUFACTURUNG COMPANIES.

| | | | | | | |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. | 1 | 4 | 4 | 20/9 | — | 3 17 2 |
| Do. Pref. | 1 | 8 | 8 | 28/3 | — | 5 13 3 |
| Babcock & Wilcox | 1 | 14 | 9 | 37/6 | +3d. | 4 16 0 |
| British Aluminium Ord. | 1 | 5 | 5 | 31/3 | +3/– | 3 4 0 |
| British Insulated Ord. | 1 | 15 | 15 | 73/6 | — | 4 1 9 |
| Brush Ord. | Stock | Nil | Nil | 35 | — | — |
| Callender's | 1 | 15 | 15 | 3⅞ | — | 4 14 0 |
| Do. 6½% Pref. | 1 | 6½ | 6½ | 28/9 | — | 4 10 5 |
| Crompton Parkinson Ord. | 5/– | 22½ | — | 18/3 | — | 6 5 7 |
| Do. 8% Pref. | 1 | 8 | 8 | 30/– | — | 5 6 8 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 24/6 | — | 6 2 5 |
| Do. 5% Deb. | Stock | 5 | 5 | 102½ | — | 4 17 7 |
| Electric Construction | 1 | Nil | Nill | 12/6 | — | — |
| Enfield Cable Ord. | 1 | 25 | 25 | 4⅞ | +⅛ | 5 9 9 |
| English Electric | 1 | Nil | Nil | 7/6 | — | — |
| Do. do. Pref. | 1 | Nil | Nil | 12/6 | — | — |
| Ever Ready | 5/– | 35 | 35 | 29/3 | +1/6 | 5 19 8 |
| Ferranti Pref. | 1 | 7 | 7 | 24/3 | — | 5 15 8 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 29/0 | — | 4 9 8 |
| Do. Ord. | 1 | 8 | 8 | 45/–xd. | +1/6 | 3 11 2 |
| Henley's | 1 | 30 | 30 | 6¼xd. | —1/6 | 4 16 0 |
| Do. 4½% Pref. | 5 | 4½ | 4½ | 5½ | — | 4 5 9 |
| India-Rubber | 1 | Nil | Nil | 3/9 | — | — |
| Johnson & Phillips | 1 | 5 | 5 | 18/3 | — | 5 9 7 |
| Siemens Ord. | 1 | 7½ | 6½ | 25/– | +1/6 | 5 4 0 |
| Telegraph Construction | £1 | Nil | Nil | 18/9 | +6d. | — |

* Dividends paid free of Income Tax.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

**1931**

25839. "Telephone repeaters." Igranic Electric Co., Ltd., and L. H. Paddle. September 15th, 1931. (393982.)

25877. "Photo-electric cells and methods of producing same." A. H. Stevens (G-M Laboratories, Inc.). September 15th, 1931. (393967.)

25937. "Electrolytic etching machines." E. G. Hartel. September 16th, 1931. (393968.)

28566. "Systems of electric motor control." International General Electric Co., Inc. October 14th, 1930. (393943.)

31142. "Electrical induction furnaces without closed ferromagnetic circuits." Allmanna Svenska Elektriska Aktiebolaget. February 9th, 1931. (393958.)

31509. "Radio transmitting and receiving systems." Marconi International Marine Communication Co., Ltd., S. D. Sloggett and T. A. Simpson. November 13th, 1931. (393933.)

31876. "Wireless receiving circuits." N. P. Hinton. November 17th, 1931. (393983.)

33425. "Illuminated indication or mimic diagrams." H. Pearce & F. Gough and Associated Electrical Industries, Ltd. December 2nd, 1931. (393936.)

33993. "Electrical switches." W. G. P. Whiting. December 8th, 1931. (393938.)

34047. "Track circuit signalling systems for railways." British Power Railway Signal Co., Ltd., S. L. Glenn and A. E. Tattersall. December 8th, 1931. (393939.)

34185. "Manufacture of continuously loaded signalling conductors and like members and lapping machines for use in the manufacture thereof." W. S. Smith and C. V. H. Garnett. December 9th, 1931. (393961.)

34196. "Refractors for directional illumination." General Electric Co., Ltd., J. M. Waldram, and G. H. Wilson. December 9th, 1931. (393972.)

34629. "Television image-producing apparatus." Electrical Research Products, Inc. December 27th, 1930. (Addition to 34481/31.) (393950.)

34631. "Rupturing of arcs in fusible arc-rupturing devices employed in conjunction with electric switches." G. B. Ellis (Metropolitan Device Corporation). December 14th, 1931. (393951.)

34642. "Electric couplings for sparking plugs." K. E. L. Guinness, C. M. Carington and K.L.G. Sparking Plugs, Ltd. December 14th, 1931. (393952.)

34643. "Sparking plug fittings." C. M. Carington and K.L.G. Sparking Plugs, Ltd. December 14th, 1931. (393953.)

34647. "Electric drives for rotary machines." International General Electric Co., Inc. December 13th, 1930. (Addition to 391239.) (393954.)

34881. "Electric signalling apparatus for use in conjunction with an automatic telephone system." E. Shipton. September 8th, 1932. (394021.)

34893. "Mirror wheels suitable for use in television, telecinematographic, and like systems." Marconi's Wireless Telegraph Co., Ltd., and R. J. Kemp. December 16th, 1931. (393978.)

34937. "Transformer power regulation." R. F. Gilson and H. R. Watson. December 17th, 1931. (393991.)

35137. "Telephone systems." Automatic Electric Co., Ltd., G. T. Baker and F. T. Belas. December 18th, 1931. (394002.)

35154. "Picture sound films." Allgemeine Elektricitäts Ges. December 24th, 1930. (394005.)

35203. "Aerial systems and electrical power systems for use in association therewith." Marconi's Wireless Telegraph Co., Ltd., N. E. Davis and R. C. Quick. December 19th, 1931. (394011.)

35430. "Electrical thermometers." C. E. Foster. December 22nd, 1931. (394025.)

35475. "Electric welding apparatus." C. R. Deglon and Associated Electrical Industries, Ltd. December 22nd, 1931. (394028.)

36110. "Radio or other high-frequency signalling systems." Soc. Française Radio-Electrique. January 10th, 1931. (394032.)

**1932**

604. "Covers for cable boxes." H. Booker and the General Electric Co., Ltd. January 8th, 1932. (394036.)

1775. "Electric control systems for elevators." British Thomson-Houston Co., Ltd. January 20th, 1931. (394045.)

1805. "Electrical accumulators." F. Boisier and A. Lizarralde. July 20th, 1931. (394046.)

3990. "Electric plug-and-socket connectors." General Electric Co., Ltd., & R. Gosden. February 10th, 1932. (394060.)

4729. "A.c. voltage regulators." Ferranti, Ltd., & G. L. Porter. February 17th, 1932. (394063.)

5049. "Electric lighting systems." Lite Watchman Corporation. February 19th, 1931. (394067.)

5340. "Operation and control of signalling devices for road vehicles." J. H. Moss. February 23rd, 1932. (394069.)

6430. "Wireless receiving apparatus." L. Keller & F. Keller. March 3rd, 1932. (394078.)

8846. "Communication or high-frequency cables." Siemens-Schuckertwerke Akt.-Ges. March 28th, 1931. (394096.)

8952. "Piezo-electric oscillators or resonators of tourmaline." C. Zeiss. April 1st, 1931. (394097.)

9700. "Junction boxes for electric cables." Sykes & Dyson, Ltd., P. Sykes, & W. Cooper. April 5th, 1932. (394100.)

9759. "Trolley supports for vehicle bodies." English Electric Co., Ltd., & W. L. Marshall. April 5th, 1932. (394101.)

10585. "Automatic or semi-automatic telephone systems." Ericsson Telephones, Ltd., & C. W. Wilman. April 13th, 1932. (394105.)

10869. "Light signals for railway and other purposes." British Power Railway Signal Co., Ltd., S. L. Glenn & E. E. Pierce. April 15th, 1932. (394108.)

10951. "Armature conductors for dynamo-electric machines." H. F. Brown & Associated Electrical Industries, Ltd. April 16th, 1932. (394109.)

11009. "Holder or support for telephone instruments." O. Horn. April 18th, 1932. (394110.)

11870. "Glass foot for thermionic valves and the like and process for making the same." Radiowerk E. Schrack Akt.-Ges. June 1st, 1931. (394116.)

12142. "Process and apparatus for electro-plating." R. E. Wilson & Fescol, Ltd. April 27th, 1932. (394117.)

12886. "Circuits for light sensitive devices." British Thomson-Houston Co., Ltd. May 4th, 1931. (394121.)

13311. "Alkaline type electric accumulators." Ionic Alkaline Batteries, Ltd., & C. J. Berg. May 9th, 1932. (394124.)

14618. "Lift systems." Etablissements Edoux-Samain Soc. Anon. June 16th, 1931. (394130.)

19022. "Electrical resistance connectors." S. B. Klein & London Electric Wire Co., & Smiths, Ltd. July 5th, 1932. (394140.)

19707. "Electric couplings for sparking plugs." K. E. L. Guinness, C. M. Carington, & K.L.G. Sparking Plugs, Ltd. December 14th, 1931. (Divided application on 393952.) (394014.)

22762. "Process for electric arc welding." H. Kost. August 14th, 1931. (394160.)

22867. "Cathode arrangements for use in thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. August 13th, 1931. (394161.)

23283. "Current collectors for electric railways." F. Szalay. August 20th, 1931. (394164.)

23356. "Thermionic tubes." Rogers Radio Tubes, Ltd. March 15th, 1932. (394165.)

24243. "System of separation between the positive and the negative electrodes of electric dry cells." Dr. B. Laurenti. September 16th, 1931. (394171.)

25495. "Radio receiving arrangement." T. Van Der Kolk & P. K. M. Klasing. September 13th, 1932. (394178.)

26266. "Communication with ultra-short waves." Dr. K. Kohl. Suddeutsche Telefon-Apparate, Kabel-und Drahtwerke Akt.-Ges. Tekade, and Pintsch Akt.-Ges. September 23rd, 1931. (394183.)

26945. "Electrical modulation systems." Marconi's Wireless Telegraph Co., Ltd. November 20th, 1931. (394186.)

28421. "Electric lines." A. F. Pessina. October 12th, 1932. (394199.)

28728. "Circuit-breaker contacts for large currents." Allmanna Svenska Elektriska Aktiebolaget. October 15th, 1931. (394200.)

28993. "Devices for handling articles with special application to electrolytic baths." Siemens & Halske Akt.-Ges. October 17th, 1931. (Addition to 298184.) (394201.)

29255. "Transformers." International General Electric Co., Inc. October 19th, 1931. (394205.)

30013. "Supply arrangements for thermionic valve apparatus." British Thomson-Houston Co., Ltd. October 26th, 1931. (394214.)

30234. "Interrupters for ignition systems." R. Bosch Akt.-Ges. January 20th, 1932. (394218.)

30338. "Stationary armatures for small electric generators." Magnetos Lucifer Soc. Anon. November 21st, 1931. (394219.)

32870. "Electric remote metering systems." International General Electric Co., Inc. November 19th, 1931. (394232.)

**1933**

1409. "Radio and like receivers." Marconi's Wireless Telegraph Co., Ltd. January 16th, 1932. (394267.)

1589. "Current-collecting devices for electric vehicles." Westinghouse Electric & Manufacturing Co." February 6th, 1932. (394269.)

5578. "Electric motors." British Thomson-Houston Co., Ltd. February 23rd, 1932. (Addition to 358402.) (394287.)

# Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 5th :—

Clampofuse. No. 540902. Class 6. Clamping and electric fusion machines and their parts.—Swan, Hunter & Wigham Richardson, Ltd., Walker, Newcastle-on-Tyne.

Blue Spot (lettering and design). No. 541450. Class 8. Loud speakers, loud speaker units and gramophone pick-ups.—British Blue Spot Co., Ltd., 94-96, Rosoman Street, E.C.1.

Dux. No. 523266. Class 8. Radio-telephonic and telegraphic instruments and apparatus and parts thereof.—Radio Instruments, Ltd., Purley Way, Croydon.

Unix. No. 538892. Class 8. Thermostats and hygrostats for use in controlling electric radiators, and electrical time switches.—Young, Osmond & Young, Ltd., Broadwater Road, Welwyn Garden City, Herts.

Ekcore. No. 540084. Class 8. Magnetic cores for radio apparatus.—E. K. Cole, Ltd., Priory Crescent, Southend-on-Sea.

Vega. No. 540258. Class 8. Valves, condensers, transformers, chokes, aerials, aerial eliminators, electrical resistances, grid leaks, coils and tone filters, all being for use in radio-telephony and telegraphy.—Octron, Ltd., Tyburn Road, Erdington, Birmingham.

Radex. No. 541012. Class 8. Electric cells and batteries (not for medical purposes).—Grosvenor Electric Batteries, Ltd., 2-3, White Street, Moorgate, E.C.2.

Eva. No. 541172. Class 8. Traffic controlling and signalling apparatus.—Automatic Electric Co., Ltd., Strowger Works, Milton Road, Liverpool.

Rover. No. 541538. Class 8. Instruments and apparatus for use in radio-telegraphy, telephony and television.—Wm. Edge & Sons, Ltd., 50, Raphael Street, Bolton.

Epic. No. 540893. Class 13. Electric switches (ordinary).—General Accessories Co., Ltd., 18-22, Euston Buildings, George Street, N.W.1.

Mercra. No. 541540. Class 13. Electric lamps (ordinary).—British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.

Tenby. No. 536087. Class 50. Electric lighting, heating, and power fittings, made of synthetic resin.—S. O. Bowker, Ltd., 20, Branston Street, Birmingham.

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

---

**Aberdeen.**—Alterations to His Majesty's Theatre for the Aberdeen Cinemas, Ltd.; G. Watt, architect.

**Aldwick** (SUSSEX).—Alterations and additions to Colebrooke House, for Sir Arthur du Cros; J. Auty, architect, 44, South Street, Chichester.

**Alloa.**—Buildings for the Alloa Co-operative Society (£4,300); the manager.

**Barking.**—Houses (114), Movers Lane Estate; C. J. Dawson, architect, Clock House Chambers, East Street.

**Barnsley.**—Works, Station Road, Wombwell, for Albert Taylor & Sons (electrical installations); P. A. Hinchcliffe, 40, Victoria Road.

**Barrow-in-Furness.**—Houses (24), Hollow Lane; L. Robinson.

**Bexley.**—Cinema, Broadway; R. Cromie, architect, 35, Baker Street, London, W.1.

**Bingley.**—Houses (174), Grange Park Estate; J. & W. Potter, builders, Leonard Street.

**Birmingham.**—Child welfare centre, Marsh Lane, Erdington (£5,644); Nichol & Nichol, architects, 117, Colmore Row. Factory, Wheelwright Road, Bromford; Percy Cox, Ltd., builders, Handsworth. Block of offices, Livery Street, for Independent Order of Oddfellows, Manchester Unity Friendly Society (electrical installation); Maddocks & Walford, builders.

**Blackpool.**—Houses (289), Deneway Avenue; A. Wilson.

**Bournemouth.**—High school for girls, Talbot Woods (£90,000), for the Governors; secretary.

**Brighton.**—School (1,000 places), Patcham, for Borough E.C.; director of education.

**Cambridge.**—Municipal offices (£142,500); C. Cowles-Voysey, architect, 14, Gray's Inn Square, London, W.C.

**Chesterfield.**—Houses (60), Whitecotes Lane, for H. Thomas & Co.

**Coventry.**—Alterations and additions to Central Fire Station (£5,000); borough surveyor, Council House, Earl Street. School, Hen Lane (£14,000), (electrical installations), for E.C.

**Cumberland.**—Extensions to Maryport Co-operative Society, Ltd., Curzon Street, Maryport; H. Oldfield, architect, 1, John Street, Workington.

**Darlington.**—Rebuilding after fire, woollen and worsted spinning mills for H. Pease & Co., Ltd. (£50,000).

**Derby.**—Senior school, for Borough E.C.; C. H. Aslin, borough architect, Gower Street.

**Eccles.**—Houses (104); Baker & Foster, builders, Burnley.

**Edinburgh.**—Shops and houses, Boswall Parkway, for the Leith Co-operative Society, Ltd.; the manager.

**Elland** (YORKS).—Houses (50), Heathfield Estate; U.D.C. surveyor.

**Essex.**—Admission hospital, Brentwood Mental Hospital; J. Stuart, county architect, Chelmsford.

**Falkirk.**—Houses (£5,000); J. Livingston & Co., builders, Kerse Lane.

**Glasgow.**—Houses (87), Sunnybank Estate; housing director and trade contractors.

**Grange-over-Sands** (LANCS).—Houses (250), Kents Bank; J. W. Grundy & Son, architects, Brogden Street, Ulverston.

**Grays.**—Houses (20); Tokeley & Goodger, builders.

**Guildford.**—Sewage pumping station (£2,350); H. Ashenden, builder.

**Halesowen.**—Houses (24), Cradley; U.D.C. surveyor.

**Hereford.**—Block of flats (£8,000, electrical work), for Hereford Dwellings Co., Ltd.; H. E. Bettington, architect, Palace Chambers.

**High Wycombe.**—Block of shops, with offices; White Bros., builders, West Wycombe Road.

**Hull.**—Cinema, Ferensway; Mr. Tarran, builder. School, Hall Road (£17,050); Robinson & Sawdon, Ltd. School, Sutton Ings; city architect.

**Hyde** (CHESHIRE).—Houses (176), Muslin Street; borough surveyor, Town Hall.

**Ilford.**—Houses (43), Birchdale Gardens; S. W. Stedman. Houses (36), Denham Drive; J. Aldridge. Houses (33), Longwood Gardens; Holland Bros. Houses (65), Sherwood Road; Haines & Warwick, Ltd. Houses (24), Woodville Gardens; P. E. Brand. Factory extension, Bogies Alley; Ilford Electrical Co.

**Irish Free State.**—(WATERFORD).—Houses (52), Airmount; borough surveyor, 12, The Mall.

**Kingston-on-Thames.**—Municipal offices, courts and fire station (£130,000); Maurice Webb, architect.

**Lancashire.**—Senior Council School, Leyland, E.C. (electrical installation); S. Wilkinson, architect, 16, Ribblesdale Place, Preston.

**Lancaster.**—Houses (156), Bowerham Road; J. Parkinson & Sons, Ltd., builders, Parliament Street.

**Leeds.**—Houses, Burley Wood Estate; A. & F. Mosley, Ltd. Houses, Meanwood Road; Bramham & Gale. Houses, Selby Road, Killingbeck; Dunhill Bros. Houses (41), York Road Estate; city architect. Cinema, Potternewton Lane; C. F. Napper. Extensions to General Infirmary. Great George Street (electrical installation); Kitson, Parish & Ledgard, architects, Vicar Lane. Alterations to Branch Road cinema, Armley; licensee.

**London.**—(CATFORD).—Houses (321), Verdant Lane Estate; H. Macintosh. (EAST DULWICH).—Improvements to Constance Road Institution (£7,716); L.C.C. architect. (FOREST HILL).—Shops and flats, Dartmouth Road; Corporation and Wardens of St. Saviours, Southwark, S.E.1. (LEWISHAM).—Houses (144), Hillside Estate, Marvels Lane; G. L. Russell. Shops and flats, St. Mildred's Road; A. Frampton. (LEYTON).—Ambulance station and residential flats, Harrow Green (£4,000); borough surveyor. (MAYFAIR).—Cinema, Curzon Street, for Lord Howe & Curzon Cinemas, Ltd.; Sir John Burnet, Tait & Lorne, architects. (TOTTENHAM).—Extensions to factory premises, Broad Lane, for D. Gestetner, Ltd., 37, Ludgate Hill, E.C.4. (WANDSWORTH).—Houses, Clapham; Cumber's Yard and Magdalen Road (£186,000); borough engineer. (WOOLWICH).—Municipal offices (£28,000); borough engineer.

**Luton.**—Houses (600), Sundon Road (electrical work); H. W. Thompson, architect.

**Maidstone.**—North School (450 places), for Borough E.C.; director of education.

**Manchester.**—Flats (130), Anson Estate; city architect. Three blocks of shops, Sale Road; Moston Brick & Building Co., Ltd. School, Royal Oak; Smith & Briggs, Ltd. Alterations to Olympia Cinema, Hyde Road, Gorton; Drury & Gomersall, architects, 15, Oxford Road. Extensions, Chorley Park School; E. E. Coleman, Ltd.

**Mansfield.**—Extensions to hospital, Westhill Drive, for the Board of Management (electrical installations), (£6,733); C. H. Hill, builder, Victoria Street.

**Middlewich** (CHESHIRE).—Re-erection of works, Darlington Street, for Birchall Bros., Ltd. (£10,000).

**Newcastle-on-Tyne.**—Houses (22), Ronald Drive; Longstaff & Bain, builders, Denton Road, Lemington. Houses (28), Silerhill Drive; E. Jeffcock, builder, Rookery Nook, Claremont Avenue, Lemington.

**Northfleet.**—Houses (31), Waterdales; U.D.C. surveyor.

**Oswestry.**—Reconstruction of the Shropshire Orthopædic Hospital, Park Hill (electrical installation); J. Hughes, builders, Egerton Street, Wrexham.

**Otley.**—Houses (24), Whiteley Croft; F. W. Barker & Co., Ltd.

**Ramsgate.**—School (£26,650) for Borough E.C.; director of education.

**Rawmarsh** (YORKS).—Houses (24); U.D.C. builder, H. Allt.

**Renfrewshire.**—Maternity and child welfare hospital (£16,000); Dr. G. Buchanan, medical officer, Renfrew.

**Rowley Regis.**—Installing electric lighting to houses, Gorstey Hill; U.D.C. clerk.

**Rugeley.**—Houses (39), Hagley Estate; W. E. Rogers, U.D.C. surveyor.

**St. Austell.**—Houses (40), Tremayne Place; housing architect.

**St. Helens** (LANCS).—Houses, Grange Park Estate; borough surveyor.

**Scarborough.**—Houses (26), Newlands Park Estate; Wilkinson and Smith, architects, 6, Queen Street.

**Seaton Delaval** (NORTHUMBERLAND).—Rebuilding of the Co-operative Society's premises (£40,000).

**Sheffield.**—Houses (32), High Hazels; McGeogh & Jones. Houses (48), Lyminster Road; T. V. & W. L. Simpson. Houses (40), Oswestry Road; Oxspring Bros. Flats (37) and shops, Moorfields Estate (£17,594); J. Laver & Sons, Ltd. Chapel, Furnace Hill; Trustees Scotland St. Methodist Chapel. Seven shops and houses, Handsworth Road; Melling Bros., Ltd.

**Shepton Mallet** (SOMERSET).—Cinema, Paul Street (electrical installation); Satchwell & Roberts, architects, 6, New Street, Birmingham.

**Shipley** (YORKS).—Houses (60), Craig Road, Windmill; H. Dawson, architect and surveyor, Town Hall.

**Shrewsbury.**—School (£4,375) for Borough E.C.; borough surveyor.

**Smethwick.**—Houses (216), Warley Estate (£62,521); Henry Boot, Ltd., builders, Moore Street, Sheffield. Works extensions, Bridge Street; Messrs. Phillips.

**Southall.**—Houses (176), St. Joseph's Estate; Sharon Development Co., Ltd.

**South Shields.**—Houses (142), Quarry Lane (£27,000); W. D. Allison, builder, Whitburn. Block of flats, Ethel Terrace; R. Summerbell & Son, builders, Rutland Street.

**Stalybridge.**—Factory extensions, Worthing Street; Bridge Colour Co., Ltd.

**Stockport.**—Houses (51); borough surveyor.

**Stockton-on-Tees.**—Houses (24), Hallisfield Street, Norton; Lane & Fox. Houses (63), Mowbray Road; G. P. Stainsby, architect.

**Stretford.**—Houses (67), Braemar Avenue; E. & J. Slater. Factory, Warwick Road; J. Crampton & Co.

**Surrey.**—Junior school, Stoneleigh Estate, Epsom (£10,300), and extensions, Felbridge School, Godstone (£3,060), and Smitham Botton School (£3,520); county architect. School, Walton-on-Thames, for County E.C.; F. Mee, deputy secretary, Kingston-on-Thames.

**Tewkesbury.**—Cinema (£12,000) for Oscar Deutsch, 8, Rotten Park Road, Edgbaston, Birmingham.

**Twickenham.**—Houses (102), Marsh Farm Estate, for R. C. Campbell; S. J. Well.

**Tynemouth.**—Houses (24), Lynn Road; T. Norris. School, Chirton Farm; Hays & Gray, architects, Camden Street, North Shields.

**Wakefield.**—Extensions and alterations to Eastmoor Council School, E.C.; P. Morris, architect, Town Hall.

**Wallsend-on-Tyne.**—Houses (96), Bewicke School Housing site; J. A. Blench, borough engineer. Houses (46), Westfield Estate; J. H. James. Shops and houses, Howden Lane; Clarke Bros., builders, York Street.

**Wareham and Wimborne.**—R.C. churches; L. Lockyer, builder, Pine Vale Crescent, Bournemouth.

**Warrington.**—Hotel, Latchford; Wright & Hamlyn, architects, 20, Winmarleigh Street.

**Washington.**—Extensions to public library; W. J. Merrett, county surveyor and architect, 43, Old Elvet, Durham.

**West Lothian.**—Cinema, Harthill; G. Wright, Harthill.

**Whitburn** (WEST LOTHIAN).—Houses (100); burgh surveyor.

**Wincanton.**—Houses (20), Bruton; H. N. Alves, R.D.C. architect, 27, High Street, Glastonbury.

**Wolverhampton.**—Houses (60), various Corporation estates (£16,158); J. Webb, Coseley.

**Worthing.**—Houses (22), Bramley Road; E. J. Woodward. Houses (167), Findon Road; M. R. Fletcher, architect for Waterman & Abell. Two blocks of flats, Chesswood Road; S. J. Downer.